ANESTHESIA SUPPLEMENT — FOLLOWING PAGE 160

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AMERICAN
JOURNAL OF SURGERY

VOL. XXIX. APRIL, 1915. No. 4.

A REVIEW OF 114 CONSECUTIVE OPERATIONS FOR ACUTE APPENDICITIS, WITHOUT MORTALITY.*

THEW WRIGHT, M.D., F.A.C.S.,
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BUFFALO, N. Y.

The following report is based upon 114 consecutive cases operated upon by me at the Buffalo General, Children's and Erie County Hospitals and in private homes (13 cases). The cases were all acute; no interval or chronic cases being included in this report, as, of course, such cases should have no mortality. This series embraces all types of the acute disease and includes several of considerable interest.

I have grouped them under the headings of "catarrhal," suppurative, gangrenous, and perforative appendicitis, the latter consisting of those cases in which the gangrenous or suppurative type had ruptured. Of the catarrhal type there were 57, of the suppurative 48, of the gangrenous 9, of the perforative 35.

It has been of interest to note how few of the cases have shown the position of the appendix to be that usually displayed in text-books as normal. Nearly all showed either a posterior position with regard to the caput ceci, varying from implanation in the retro-cecal fossa to the true retro-cecal type lying both retro-cecal and extraperitoneal; or a short and distorted meso-appendix causing kinking or constriction of the appendix. This leads me to believe that anatomical peculiarities causing an interference with the lumen of the appendix must be an etiological factor of considerable importance in the disease. Lane's kink and the various pericolic membranes which we have noticed occasionally causing symptoms in chronic cases have been noted but a few times in this series, for the acute inflammation present has in the majority of cases forbidden manipulations more extensive than those necessary to meet the immediate indication.

There were in this series three cases in which the first symptom, pain, was evidently coincident with perforation of the appendix and the beginning of peritonitis. One was a man whose first symptom was sudden and severe pain in the right lower quadrant which seized him about 10.30 A.M. I saw him at 3 P.M., operated at once, and found a perforation in the tip of the appendix and free pus. The other two were operated upon eight and ten hours, respectively, after the sudden pain. In both these cases there was a large amount of pus and in neither case were there any adhesions.

Pain was the initial symptom in all these cases, but two, both of which were children, one 5, the other 9, in which the attack was ushered in by vomiting, which persisted for several hours before the onset of pain.

In three of the suppurative but non-perforative type, with the disease still confined to the appendix, the rigidity was so marked on both sides of the abdomen, not even relaxing under anesthesia, that a perforation was suspected.

Two of this series were in pregnant women, one five, the other seven months pregnant. Both aborted. The one pregnant five months had been sick four days and had an appendix with a short mesentery imbedded in the retro-cecal fossa. The other had a perforated purulent appendix adherent to the fundus of the uterus near the umbilicus, and had been sick three days.

One case was a woman weighing 270 pounds, with a ruptured empyema of the appendix in the third day of the disease. Two weeks following operation she developed an acute cholecystitis which was diagnosed but treated expectantly because of the proximity of the discharging well in her abdominal wall. After 24 hours the gall-bladder ruptured and an operation was done, evacuating a pint of bile and pus containing forty-odd stones. She made an uneventful recovery.

I appreciate my good fortune in having so many cases recover, but I feel that with the increasing knowledge of both the profession and the laity, these statistics should, as a rule, be improved rather than otherwise. Even to-day we are getting too many cases in the advanced stages of the disease. As Murphy says, the mortality of appendicitis is that of delay, and every case of appendicitis lost means someone to blame.

*Read before the Buffalo Academy of Medicine, January 6, 1915.

In diagnosis I have come to rely upon the history, and the fingers, *i. e., palpation.* Blood counts were made in a number of this series, but I am coming to place less value upon them, both as an aid in diagnosis and in determining the type of disease; for I find that they are unnecessary in diagnosis and of little value in telling the condition present, several of the pus cases having normal counts and some of the catarrhal cases showing the highest leucocytosis. I have usually found leucocytosis present in my cases, but I have not delayed operation on account of its absence.

My rule has been to operate at the earliest possible moment after the diagnosis was made, never allowing a case to wait for a more convenient time, for I have felt both unable to tell what was going to take place in the abdomen and often what had already transpired.

I believe that our knowledge of how to operate has increased since the time when Ochsner advised delay in cases over 48 hours old, and I hold that all cases should be operated upon when seen if proper operative and post-operative facilities are at hand. I believe that gentleness in handling the tissues, avoidance of more manipulation than is absolutely necessary, ample drainage, plus starvation, proctoclysis, Fowler's position, and if necessary gastric lavage will give a lower mortality and morbidity than non-interference.

I believe with Ochsner that intestinal peristalsis is a great factor in the spreading of a peritonitis, and I allow nothing by mouth so long as a peritonitis exists. I drain all perforated cases and all gangrenous cases where there is pus. I do not consider the mere presence of fluid, no matter how much nor how turbid, an indication for drainage. I make no effort to evacuate pus other than to sponge out that which presents at the wound; believing that the indication is to relieve tension and establish a point of least resistance toward the wound. I use the Fowler, or pelvis-low position in all drainage cases, but I prefer to obtain it by elevating the head of the bed rather than by means of a head-rest or patent mattress, for one can thus be sure that it is always maintained, and I find it more comfortable for the patients.

For drainage I use the split soft rubber tube of one-half inch lumen, placing one tube at the appendix stump and, if there is pus in the pelvis, placing another tube to the bottom of the pelvic cavity. I never irrigate.

In dealing with a localized abscess, I endeavor to wall it off, with gauze, from the general peritoneal cavity before evacuating, not because of the fear of overflow, but because of the danger of poking the finger among the agglutinated loops of bowel during the delivery of the appendix and thus allowing pus to leak into the general peritoneal cavity without knowing it.

There was but one case in this series in which it seemed wise merely to drain an abscess, leaving the removal of the appendix for a later date. Recurrent discomfort in the appendix region led me to operate upon the case ten months later when an obliterated stump was found, the discomfort being caused by an adhesion running from the cecum to the right ovary.

The principles of treatment have been the same throughout this series. The preparation consists of a dry shave, a coat of tincture of iodine, and a hypodermatic injection of morphine and scopolamine. Operation is performed under combined local and general anesthesia. I greatly prefer nitrous oxide-oxygen narcosis, though a third of this series received ether by the drop method. The use of gas and oxygen unquestionably reduces operative shock and materially aids in lessening post-operative discomfort.

In the majority of these cases the right rectus incision was used, though the low McBurney was employed in about a fourth of the cases seen early. I prefer the rectus incision when a large exposure is needed. The appendix is located as quickly as possible, its mesentery is crushed and ligated in the forceps mark, the appendix is likewise crushed and ligated at its base and cut between the ligature and a forceps. In the non-perforative cases removal of the appendix is preceded by the passing of a linen purse-string suture, and the appendix stump is touched with iodine and depressed into the cecal wall. In the perforative cases a catgut suture is used. If the cecum is edematous and appears friable no burying of the stump is attempted. No endeavor to suture fat or mesentery over the stump is made in cases where the cecum will not hold a purse-string suture. The wound is closed in layers throughout or to the tubes in drainage cases.

Post-operative treatment consists of Fowler's position in drainage cases; continuous proctoclysis in all cases, using sterile tap water in preference to salt solution and adding to it tincture of opium in ten to fifteen minim doses every two to four hours to keep the patient comfortable, supplementing this with morphine hypodermatically in the severe peritonitis cases. Nothing is allowed by mouth so long as there is evidence of peritoneal irritation, and the stomach is washed out if there is any suggestion of regurgitation or gastric dilatation or if vomiting

persists. No cathartics are given and no attempt to move the bowels is made in any case for 48 hours, when a small enema is administered. In the severe cases of peritonitis I endeavor to keep the bowels absolutely at rest and I believe in the use of morphine to the amount required to keep the patient quiet.

This series of successful operations was stopped by a case operated upon within 36 hours from the first symptoms of the disease, a time when we should expect very few fatalities. He had, however, received osteopathic treatment with a view, as the osteopath told me, of massaging his "pylorus" which he located between the umbilicus and the iliac rest. On operation I found a ruptured appendix and about the most extensive peritonitis that it has been my misfortune to see. The patient was overwhelmed by the toxemia and died within 18 hours from the time of operation.

ABSTRACT OF CASE HISTORIES.

J. M., 20, second attack, suppurative, sick 48 hours.

A. H., 25, first attack, perforated, gangrenous, free pus, drained, sick 72 hours.

R. S., 9, first attack, sick four days, gangrenous, pus, drained.

C. B., 10, first attack, suppurative, sick 36 hours.

T. J. G., 25, first attack catarrhal, sick 12 hours.

J. F., 27, first attack suppurative and perforated, drained, sick 48 hours.

E. W., 18, first attack, suppurative and perforated, drained, sick 48 hours.

H. A. F., 20, second attack, suppurative and perforated, drained, sick 36 hours.

A. K., 17, second attack, catarrhal, sick 12 hours.

J. E., 27, first attack, catarrhal, sick 12 hours.

R. G. F., 50, first attack, gangrenous, no drain, sick 18 hours.

J. N., 30, second attack, catarrhal, sick 12 hours.

F. R., 36, first attack, suppurative, sick 18 hours.

W F., 30, first attack, gangrenous and perforated, drained, sick 72 hours.

D. T., 16, third attack, catarrhal, sick 12 hours.

M. M., 22, first attack, catarrhal, sick 18 hours.

W. S., 9, first attack, catarrhal, sick 12 hours.

M. S., 14, suppurative, sick 18 hours.

W. E., 40, first attack, gangrenous, no drain, sick 36 hours.

A. H. W., 30, first attack, gangrenous, free pus, 2 drains, sick 3 days.

J. C., 10, first attack, suppurative, perforated, drained, sick 50 hours.

L. F., 20, first attack, catarrhal, sick 18 hours.

D. B., 40, second attack, gangrenous, perforated, drained, sick 48 hours.

G. T., 18, first attack, suppurative, sick 24 hours.

E. K., 40, first attack, catarrhal, sick 18 hours.

M. K., 18, second attack, catarrhal, sick 12 hours.

M. E., 18, first attack, catarrhal, sick 18 hours.

W. H. L., 25, second attack, suppurative, perforated, drained, sick 36 hours.

M. S., 17, first attack, catarrhal, sick 6 hours.

R. S., 10, second attack, catarrhal, sick 6 hours.

F. E., 25, second attack, catarrhal, sick 10 hours.

L. P., 30, first attack, catarrhal, sick 18 hours.

S. T., 28, first attack, suppurative, sick 36 hours.

S. P., 30, first attack, suppurative, perforated, drained, sick 48 hours.

J. R., 20, third attack, suppurative, sick 12 hours.

M. M., 24, first attack, catarrhal, sick 48 hours.

M. S., 30, first attack, suppurative, perforated, drained, sick 72 hours. This patient was seven months pregnant.

A. R., 27, first attack, suppurative, perforated, drained, sick 36 hours.

F. N., 33, first attack, suppurative, perforated, drained, sick 48 hours. This patient developed a suppurative cholecystitis two weeks after operation. Gall-bladder ruptured in 24 hours and second operation was made.

E. F., 31, second attack, catarrhal, sick 36 hours.

W. N., 27, first attack, catarrhal, sick 12 hours.

F. G., 18, second attack, suppurative, perforated, drained. This patient had first symptom of pain at 10.30, was operated on at 3, and appendix was found ruptured, and free pus present.

M. D., 12, first attack, catarrhal, sick 12 hours.

P. L., 28, first attack, catarrhal, sick 24 hours.

F. C. G., 20, first attack, catarrhal, sick 18 hours.

M. B., 28, first attack, catarrhal, sick 12 hours.

H. W., 23, first attack, catarrhal, sick 12 hours.

W. J., 30, first attack, gangrenous, perforated, drained, sick 48 hours.

J. M., 30, first attack, catarrhal, sick 18 hours.

J. T., 9, first attack, catarrhal, sick 24 hours.

C. T., 30, second attack, catarrhal, sick 18 hours.

W. C., 31, second attack, catarrhal, sick 18 hours.

C. H., 11, first attack, suppurative, perforated, drained, sick 3 days.

T. B., 7, first attack, suppurative, sick 36 hours.

E. G., 20, first attack, catarrhal, sick 24 hours.

L. S., 20, first attack, catarrhal, sick 24 hours.

M. B., 20, first attack, catarrhal, sick 36 hours.

M. R., 18, first attack, suppurative, sick 24 hours.

C. R., 25, first attack, catarrhal, sick 18 hours.

T. R., 9, first attack, catarrhal, sick 24 hours.

M. M., 29, first attack, suppurative, perforated, drained, sick 36 hours.

W. F., 30, first attack, suppurative, perforated, drained, sick 48 hours.

J. F., 27, first attack, catarrhal, sick 36 hours.

J. S., 20, second attack, suppurative, sick 40 hours.

M. V., 27, numerous attacks, suppurative, sick 24 hours.

F. W., 35, suppurative, perforated, drained, sick 48 hours.

T. G., 33, second attack, suppurative perforated, drained, sick 48 hours.

G. A., 11, first attack, catarrhal, sick 18 hours.

J. D., 22, first attack, catarrhal, sick 24 hours.

E. W., 16, first attack, catarrhal, sick 12 hours.

A. F. B., 23, first attack, suppurative, sick 18 hours.

H. R. W., 30, several attacks, suppurative, sick 18 hours.

M. K., 22, first attack, suppurative, perforated, drained, sick 48 hours. Appendix left in and removed at operation ten months later.

P. B., 19, third attack, catarrhal, sick 18 hours.

F. C., 9, first attack, suppurative, perforated, large amount of free pus, drained, sick 72 hours.

K. B., 26, first attack, catarrhal, sick 24 hours.

E. M., 30, second attack, catarrhal, sick 18 hours.

W. B., 19, several attacks, catarrhal, sick 18 hours.

M. G., 20, suppurative, perforated, free pus, drained, sick 8 hours.

W. S., 33, several attacks, catarrhal, sick 24 hours.

R. S., 14, second attack, catarrhal, sick 48 hours.

M. L., 7, second attack, catarrhal, sick 24 hours.

A. H., 70, first attack, catarrhal, sick 12 hours.

M. H., 9, first attack, catarrhal, sick 18 hours.

J. M., 20, second attack, catarrhal, sick 36 hours.

A. S., 17, first attack, suppurative, perforated, drained, sick 72 hours.

R. V., 32, several attacks, catarrhal, sick 24 hours.

F. B., 35, first attack, catarrhal, sick 18 hours.

A. W., 40, first attack, catarrhal, sick 24 hours.

F. K., 27, first attack, suppurative, sick 90 hours, 5 months pregnant.

A. F., 28, first attack, suppurative, perforated, drained, sick 48 hours.

B. C., 40, several attacks, suppurative, perforated, drained, sick 72 hours.

J. McM., 27, first attack, catarrhal, sick 18 hours.

J. S., 30, first attack, catarrhal, sick 18 hours.

J. H. W., 30, first attack, suppurative, perforated, drained, sick 36 hours.

J. D. M., 22, first attack, suppurative, perforated, drained, sick four days.

H. F., 11, first attack, suppurative, perforated, drained, sick 3 days.

H. P., 17, second attack, catarrhal, sick 24 hours.

J. H. K., suppurative, perforated, drained, sick 5 days.

M. G., 5, first attack, suppurative, perforated, much free pus, drained, sick 48 hours.

H. P., 18, first attack, catarrhal, sick 24 hours.

P. E., 24, second attack, catarrhal, sick 24 hours.

R. F., 20, first attack, suppurative, perforated, drained.

E. P., 11, first attack, suppurative, perforated, extensive peritonitis, drained, sick 4 days.

R. C., 12, first attack, suppurative, sick 3 days.

F. H., 18, first attack, suppurative, perforated, drained.

I. R., 22, first attack, catarrhal, sick 24 hours.

L. R., 26, first attack, catarrhal, sick 18 hours.

M. K., 29, first attack, suppurative, perforated, drained, sick 10 hours.

J. B., 7, first attack, suppurative, perforated, much free pus, drained, sick 72 hours.

A. K., 8, catarrhal, sick 24 hours.

W. H., 10, first attack, suppurative, sick 18 hours.

A. S., 28, second attack, gangrenous, perforated, drained, sick 48 hours.

R. W., 19, first attack, suppurative, sick 24 hours.

479 DELAWARE AVENUE.

THE PREVENTION AND TREATMENT OF THE DISABILITIES FOLLOWING FRACTURES OF THE LIMBS.

ASTLEY P. C. ASHHURST, M.D., F.A.C.S.,
PHILADELPHIA.

(*Continued from the March issue.*)

1. *Disability from Lesions of the Soft Parts.*

In every fracture there is contusion, ecchymosis, extravasation, and often muscular laceration, accompanying the osseous injury; and the disability which follows the fracture, in a large proportion of cases, is due to *neglect of the soft parts,* while attention has been concentrated upon the bony deformity.

Yet the surgeon must not neglect the osseous lesion in his devotion to the care of the soft parts. There is a happy medium between the school of Lucas-Championnière, which ignores the bones and devotes all its attention to the soft parts by massage and by mobilization of the neighboring joints, and the modern operative school which teaches that so long as the ends of the broken bone are brought into absolute anatomical reposition the soft parts may be safely left to take care of themselves. The former school has the merit of recognizing that the bones are not sticks or stones or bars of iron, but that they are living tissue, and if given even a slight chance will rectify their own deformities in many instances and so produce no lasting disability; while the operative school is too prone to ignore primary lesions of the soft parts, and to blame all subsequent disability not on these (the real cause) but on insignificant osseous distortions appreciable only on skiagraphic examination.

It is not my purpose now to describe in detail the methods to be employed in proper care of the soft parts, but I may state as a general rule that for the first week or ten days the condition of the soft parts should receive paramount consideration, especially when the fracture is not close to a joint. When the fracture is close to a joint there is no doubt that the easiest means of relieving the swelling of the soft parts is to secure anatomical reduction of the fragments as soon as possible; and this no doubt is true also though in less degree in the case of fractures in the shafts of long bones. But in the latter instances it is very much more difficult to secure accurate reduction without open operation than when the fracture is close to a joint, and malunion of a diaphyseal fracture *per se* is very rarely a cause of disability. Hence I believe that in diaphyseal fractures attempts at reduction sometimes may be postponed for a few days until the swelling begins to subside. Up until

the end of the first week no insuperable obstacle to reduction will develop, unless it was present also from the very moment of the accident, as for example, entanglement of the fragments in the soft parts.

Proper care of the soft parts requires that the dressing be removed two or three times weekly (less often as the case advances) to permit cleansing of the skin; and as union progresses to allow of very gentle passive movement of the neighboring joints. Such passive movements should never cause pain, and as already indicated should be substituted by active movements so soon as union of the bones permits.

Fig. 1.

Fig. 2.

One of the most frequent causes of disability due to neglect of the soft parts is edema of the limb below the seat of injury. Of course such edema is not always avoidable in the lower extremity, but in the upper limb it is nearly invariably an evidence of neglect. A common and perfectly unjustifiable error is neglect to bandage the hand and forearm in cases of fracture of the humerus, or even neglect to bandage below the wrist in cases of fracture in this situation. In treating a Colles's fracture of the radius, for instance, it is no unusual fault for the dresser to leave the hand and fingers totally unsupported by the bandage, no turns of which pass below the thumb; the result is that the hand and fingers become very edematous, and stiffness, pain and marked disability persist in the fingers long after the bone has united. Similarly, in fractures of the humerus, the dresser will make all secure from the shoulder to the elbow, but will leave the hand and forearm bare; they then become edematous, and long after the shoulder is healed, the patient must be treated for stiffness in the wrist and fingers. Only last summer I had to keep such a patient under treatment for more than three months after the shoulder fracture ceased to trouble her, because she was totally incapacitated by the condition of her hand; even more incapacitated, indeed, than if her hand had been amputated for those three months, since she suffered much discomfort from its presence.

In the lower extremity, as I have said, swelling of the foot cannot always be prevented during convalescence, owing to its constantly dependent position; but I am sure much less disability would result on this score if the soft parts of the lower extremity received, as is their due, two or three times weekly, proper "dressing" as in the case of fractures in the upper extremity, instead of being imprisoned for weeks at a time, as is usually the case, in circular gypsum cases.

Fig. 3.

Perhaps the most conspicuous example of lesions of the soft parts overshadowing those of the bones, is to be found in cases of Volkman's contracture. Though this seriously disabling condition occasionally has developed in cases where no dressings at all have been employed, it is the result, in the vast majority of instances of constriction from too tightly applied splints or bandages, particularly when these are not removed for some days or weeks at a time. It should be an invariable rule for the surgeon to see the patient the next day after the fracture, and personally to examine the condition of the finger tips and make certain that there is no interference with the circulation, and that the

dressing is comfortable. An uncomfortable dressing always is inefficient even if not positively harmful.

2. Compound Fractures.

There is no class of fractures in which care of the soft parts assumes such importance as in compound fractures. Here the bones are quite a secondary consideration; and even in cases where immediate formal operation is required it is usually inadvisable to apply plate or other form of internal fixation until asepsis can be assured by definitive healing of the soft parts.

Fig. 4.

I cite below several illustrative cases, in all of which the state of the soft parts made it proper for the first dressing to assume the character of a major operation.

CASE I: *Compound comminuted fracture of radius and ulna, rupture of ulnar artery and nerve, etc.*

Fred B., aged 28 years, was admitted to Dr. Frazier's service in the Episcopal Hospital, Dec. 12, 1909. His left forearm had been crushed between two freight cars while he was engaged in coupling them. All four ends of the broken radius and ulna projected through a jagged wound of the soft parts, the skin being torn loose all around the circumference of the limb except for 4 cm. over the extensor surface of the radius, and the flexor muscles being extensively ruptured. There was loss of sensation in the distribution of the ulnar nerve below the injury. I operated about eight hours after injury. The ulnar artery was crushed and its ends widely separated; both ends were ligated. The ulnar nerve was crushed for a distance of 4 cm., only the fibrous sheath remaining intact. By dissecting the proximal end even to the elbow, and the distal end to the wrist, and by flexing the wrist, it was impossible to make the ends of the ulnar nerve meet by 1.25 cm. Therefore a flap was turned up from the distal segment of the nerve, about 3 cm. in length, and sutured to the central end, without tension. The ends of the radius were drilled, and united by a suture of chromic gut No. 3. The ulna was found to be broken in two places, the intervening fragment being composed of three splinters. Silver wire was wrapped around these splinters, and they were sutured to the lower fragment of the ulna by chromic gut, passed through drill holes. A rubber drainage tube was passed across the flexor surface of the bones, and the ruptured muscles were carefully repaired. The limb was kept vertical, and alcohol douches were given as often as the dressings became dry.

The attempts to secure fixation of the bones were not very successful, as is evident from skiagraphs made soon after operation; this gives one the impression that the bones might have been struck by lightning. There was prolonged but never very active suppuration and sloughing, and the three splinters composing the middle fragment of the ulna were soon discharged as sequestra. Bony union occurred in the radius, but only fibrous union in the ulna. About a year after the accident, and when the soft parts had been healed for more than eight months, a sequestrum worked loose from the radius. Though an excellent result was obtained eventually, I believe even the little that was done to the bones at the time of operation tended to delay repair.

Compare, for instance, the much more rapid recovery in the following even severer case.

CASE II: *Crush of forearm, double compound fracture of the humerus.*

Fred H., aged 35 years, was admitted to my service in the Episcopal Hospital May 27, 1913. His right arm had been caught in machinery, and he had been knocked up against the ceiling and then flung across the room. Here also all four ends of the broken radius and ulna projected from a gaping wound in the flexor surface of the forearm; there was also a double fracture of the humerus of the same side, and one of the fragments of the humerus was projecting through the skin, on the inner side of the arm, below the axilla.

Operation was immediate. Fortunately no arteries or nerves were injured; only the basilic vein, transfixed by the humeral fragment, required double ligation. The upper fragment of the ulna was resected, as it could not be satisfactorily cleansed. Partial reduction of the various bony displacements was made, but no form of internal fixation was employed. Skiagraphs, made as soon as the patient could be moved from his room, showed that fairly good position of the bones had been secured. The soft parts healed with very little sloughing, no sequestration of the bones occurred, and firm union developed in the humerus within six weeks (Figs. 1 and 2). Though only fibrous union occurred in the forearm, and necessitated a subsequent operation, it is manifest that no attempt at primary fixation of the fragments would have obviated this result; while the absence

of foreign bodies from the wounds permitted rapid healing of the soft parts, a contrast to the cases where metal splints are employed.

I may add that in spite of the extensive lesions of the soft parts in Cases 3 and 4, there was never any disability from stiffness of the neighboring joints; the fingers are perfectly supple.

CASE III: *Compound comminuted fracture of radius, and compound dislocation of ulna at wrist.*

William E., aged 52 years, had his left forearm caught in machinery, Oct. 13, 1914, and was brought to the Episcopal Hospital. The carpal extremity of the ulna was sticking out through the soft parts for three or four inches, and there was a compound

Fig. 5.

Fig. 6.

comminuted fracture of the radius, with great laceration of the soft parts. After having his wounds dressed in the receiving ward, the patient absolutely refused to remain in the hospital, maintaining that the injury was trivial. Four days later, October 17, he presented himself at the dispensary, and was again urged to remain in the ward, but again went home. On his return home, however, he found himself so weak that he sent for the ambulance, which brought him to Dr. Frazier's service at 5.30 p. m.

Operation. At 7.30 p. m., I operated. The hand, forearm, and hand were greatly swollen; there were lymphageitic streaks extending toward the axilla, and the man was very septic, with a temperature of 101° F. All the sutures were removed, and the original wounds were enlarged, giving vent to large amounts of pus. The lower end of the ulna was again luxated, and was left protruding for about 7 cm. (nearly 3 inches), in order to provide for drainage; and a tube was passed through the wrist joint, which was full of pus, and another tube across the forearm at the site of fracture, through the interosseous space. Culture of the pus gave a pure growth of staphylococcus aureus. All opened surfaces were swabbed with hot carbolic solution (1:20), alcohol dressings were applied, and the forearm was suspended vertically for a week. The patient's temperature fell at once, the swelling subsided within a couple of days, and by dint of absolutely disregarding the position of the bones, it became possible to save the patient's arm, which was in a condition almost justifying amputation when first seen. Fig. 3 is from a skiagraph made 17 days after the operation; it shows the ulna still projecting far beyond the soft parts, and the radial fragments overlapping until the joint surface is at the level of the upper fragment. The ulna gradually was covered in by the soft parts, and two months after operation projected less than an inch. Fig. 4, from a skiagraph made nearly three months after opera-

Fig. 7.

Fig. 8.

tion, shows to what a surprising degree the radial deformity has been spontaneously corrected. On January 15, 1915, three months after injury, I resected the end of the ulna, and removed a few small sequestra from the radius, in which fibrous union was present. There was at this time scarcely any suppuration from the few sinuses still present, and active movements in the fingers were beginning to be possible.

This case shows the great danger of inefficient care of the soft parts from the first. Had the patient been willing to remain in the hospital when first injured, with his forearm in vertical suspension, and with irrigation, it is quite possible that no serious infection would have occurred; and that the soft parts would have been in a condition to warrant one in correcting the bony deformity before malunion had occurred. As it is, the man put his life in jeopardy, very nearly lost his arm, has been totally incapacitated for months, and will never possess a very useful hand.

3. *Treatment of Disability from Lesions of the Soft Parts.*

Active movements and functional use of the limb

are the most important factors in overcoming disabilities due to lesions of the soft parts; *massage* is a valuable adjuvant; but passive movements, especially if forced, usually are useless and often are harmful. These facts should be, and indeed actually are well known, but I see them ignored with lamentable frequency. To cite a case in point:

CASE IV. *Stiff elbow following forced passive movements after fracture.*

A surgeon brought his nephew to see me August 9, 1911. The boy, aged 7 years, had injured his left elbow eight weeks previously. His uncle had dressed the elbow in the Velpeau position, and had

Fig. 9.

a skiagraph taken, which showed a fracture of the external condyle of the humerus, not fully reduced. Three weeks after the injury the boy was taken to a consultant, who made further attempts, under ether, to reduce the deformity. The elbow was then dressed on an anterior right angled splint for two days; then all dressings were discontinued, and four days after the attempted reduction passive movements were prescribed. This prescription was carried out most energetically by the masseur, who *forced* the elbow into full flexion and full extension *every day* for three weeks continuously. By this time the boy had suffered so much pain, and the elbow had become so manifestly worse, that a halt was called.

When I was asked to see the boy, eight weeks after the injury, and one week after passive motion had been stopped, I found the joint hot, tender, and painful on motion. The range of motion was only 50 degrees (85 to 135 degrees). The lower end of the humerus was half again as thick as normal in its antero-posterior diameter and there was tenderness on pressure over both biceps and triceps. Skiagraphs made the previous day showed the joint fairly normal, but there was new formed subperiosteal bone on the front and back of the humerus, where the forced passive motion had exerted its greatest influence; while the only new-formed bone visible in antero-posterior view was above the fractured external condyle; but there was very little exuberant callus here.

My advice was to do absolutely nothing to the boy's elbow for a month, and to let him use it as he wanted. His uncle afterwards reported to me that at the end of two months the range of motion in the elbow was very nearly normal in both flexion and extension, and that the joint gave no further trouble.

This lesson I learned early in my professional life. As a resident physician in the hospitals some of my chiefs "believed in the use of early passive motion" for fractures around the elbow; and many is the elbow on which at their instigation I enforced violent passive movement with the idea of preventing or of breaking up adhesions, destroying or wearing away exuberant callus, etc. The childred kicked, screamed, and yelled; their parents, the orderly, and the nurse held them still, while I gave them excruciating pain, and unwittingly aroused more osteogenetic and inflammatory processes around the elbow than were present before; and I never saw an elbow which failed to stiffen up under this treatment. Fractures around the elbow I regarded as hopeless; I anticipated a stiff joint, deformity, or at least considerable limitation of motion almost in every case, and I rarely failed to find it. But as years have gone by I have become more and more convinced of the truth of Stimson's epigrammatic statement: "If you leave the arm alone, you save your time, and the patient's time, and he gets well quite as promptly."

Now what is true of the elbow joint is true of all joints; and even in the case of fractures of the diaphyses of long bones, *forced, painful, passive movements always are to be avoided.* If the neighboring joints are stiff, encourage the patient to use the parts as much as he can; aid the absorption of exudate by hot-air baking and massage; but beware of passive motion.

It must be admitted, however, that occasionally in adults it is possible to improve the range of motion in a joint by forcible passive movements under an anesthetic; but it is possible only when the joint is no longer hot and painful, only when the inflammatory reaction initiated by the fracture has long since subsided.

4. *Fractures in the Diaphyses of the Long Bones.*

I come next to speak of the supposed necessity, or at least of the propriety of securing anatomical replacement of the fragments in a diaphyseal fracture. Not only is *such* replacement often impossible, but I do not hesitate to state that in most cases I regard it as totally unnecessary. Reasonably

accurate reduction is desirable, and usually possible; but it is a very rare thing for disability to result solely from failure to secure anatomically accurate reduction of such a fracture. It is sufficient, in such fractures, as I have pointed out on former occasions, to secure *firm bony union,* with *no appreciable shortening,* and with *preservation of the axis of the limb.* The power of nature in rounding off bony prominences and in bridging gaps by callus is especially manifest in childhood; and it is in them that the most satisfactory results are obtained from unpromising beginnings. But this power, though less manifest in adults still is active in them. Let me cite several cases in illustration.

Fig. 10.

Fig. 11.

CASE V: *Comminuted fracture of left femur; irreducible; recovery without disability.*

Milton G., aged 7 years, was admitted to Dr. Frazier's service in the Episcopal Hospital Nov. 1, 1914. A wagon had run over the boy's thigh, and on account of the condition of the soft parts, attempts at reduction were delayed. There was 1.5 cm. shortening. Meantime the limb was placed in a Hamilton splint, and sufficient weights were applied to overcome shortening almost entirely. Skiagraphs, however, showed very marked displacement of the fragments (Figs. 5 and 6). On November 20 the child was etherized and I made attempts to secure reduction. Subsequent skiagraphs showed that the position was scarcely at all improved, and on account of the very wide separation of the fragments, I feared nonunion, in spite of the patient's youth. Therefore I thought that operative reduction was indicated. But two days later, November 22, before operation could be done, the children's ward was placed under quarantine for an outbreak of scarlet fever. The limb was therefore re-dressed on a Hamilton splint, and conservative measures continued. On December 20, some union was apparent, and early in January union became very firm. There was now only 0.5 cm. shortening. The *vis medicatrix naturæ* had done its work well (Figs. 7 and 8). Toward the end of January, the boy was able to walk, and there is every prospect of his ultimate recovery of perfect function.

This case of course is an extreme example, but serves well to demonstrate the slight importance in children of accurate anatomical reduction of diaphyseal fractures. Let me now cite some cases in adults: one such is the fracture of the humerus (a double compound fracture) which occurred in the patient already recorded herewith as Case 2. Other examples are the following:

CASE VI: *Fracture of shaft of femur, unreduced for thirty years. Shortening 6.5 cm.; very little disability.*

A man, aged 50 years, came under my care in Dr. Frazier's service at the Episcopal Hospital in August, 1911. Thirty years previously he had sustained a fracture of his femur; he had just fallen again, and feared he had re-fractured the same bone. There appeared, however, to be only a contusion. For thirty years this patient had pursued his usual occupation, entailing hard physical labor, earning from three to four dollars daily, with shortening of 6.5 cm. He wore a lift in his heel, and walked without a disabling limp. He had some pain in his thigh in damp weather. I asked him how much he could have made if his thigh never had been broken, and he replied, perhaps five or six dollars daily.

CASE VII: *Fracture of left femur, unreduced; no disability.*

Louis M., aged 55 years, was admitted to Dr. Frazier's service in the Episcopal Hospital Oct. 31, 1914, with compound fractures of both femurs. In the preceding May he had fractured his right femur, but the second fracture, in November, 1914, occurred a little below the previous injury. The skiagraph made after the second fracture (Fig. 9) shows that the first fracture had united with considerable deformity. In spite of this deformity, this patient had only 2 cm. shortening on leaving the hospital after his first accident. He had used crutches for five weeks after his discharge, being out of work thirteen weeks in all; and had worked as teamster until his second accident, without any disability whatever. His knee, he said, flexed to a right angle; he wore no raise on his heel to compensate for the shortening, and he considered himself an entirely able-bodied man until his second accident. No better proof of the solidity of the union could be required than is furnished by the fact that the second accident produced not a re-fracture at the site of the old injury, but an entirely distinct fracture below.

Of course the results in these patients do not form an argument against attempting to secure better reduction, but they certainly prove that very

marked deformity (so long as the axis is preserved) in a diaphyseal fracture may cause very little disability. These cases are examples of extreme deformity; and if satisfactory function can be secured in such cases, much more certainly will it be secured in cases where the primary deformity is slight or in those in which reduction is easily obtained. Certainly I admit, and no one will dispute, that it is desirable to secure as accurate reduction as is possible; but I contend that sufficient reduction usually can be secured (almost always in children) without open operative intervention.*

5. *Fractures Near Joints.*

Very different are fractures near joints. Quite apart from the questions of axial deviation, of rotatory deformity, of shortening, and of lesions of the soft parts (all of which factors must be considered here as well as in fractures of the diaphyses), there is the additional and all-important factor of *impairment of joint motion.* Unless accurate reduction is secured there will be permanent disability of some degree, varying with the extent of persistent deformity.

Fig. 12.

Fig. 13.

Fractures at the elbow and the ankle probably furnish the largest proportion of cases of disability and from the slightest grades of deformity; but fractures at the wrist are a frequent cause; while those of the shoulder and hip, though relatively less frequent, nevertheless present a rather high percentage of disability. Fractures at the knee (except those of the patella, which may be disregarded in this connection) are so rare that few such patients are seen complaining of disability.

It will be noted subsequently that *nearly all fractures which require operation for the relief of disability due to malunion of the bones are fractures near joints.* So convinced am I of the necessity of securing accurate reduction in joint fractures, that I believe open operative reduction should be undertaken in the vast majority of cases where bloodless attempts fail to secure anatomical reposition. Of course open treatment in these as in other fractures must not be adopted except where suitable facilities exist, both as regards the operator and the operating room.

Fortunately the bloodless reduction of joint fractures is relatively easy compared to that of diaphyseal fractures, since the position of the shorter fragment usually can be controlled through the neighboring joint. Thus, *abduction* at the shoulder and hip, *flexion* at the elbow and knee, and *adduction* at the wrist and ankle may be employed when necessary to maintain the fragments in apposition.

I believe it is much more important, also, in joint fractures than in diaphyseal fractures for reduction to be secured as soon as possible after the accident. Delay of three or four days may not only render reduction extremely difficult or even impossible, but may allow such swelling of the soft parts to occur as to ensure disability on this score even if reduction of the bones is subsequently obtained.

It is important also in joint fractures, when once accurate reduction has been obtained, to leave the joint at rest until bony union has occurred. Attempts at early passive motion are particularly harmful in these fractures. When once bony union has occurred, the patient will be able to execute active movements without pain, and in this manner will regain the normal range of motion in a short time. If stiffness persists, it is due to the condition of the soft parts; and this condition is due in its turn either to failure to reduce early enough and accurately enough, or to neglect of the soft parts while the fracture was mending. If the soft parts are in good condition and joint motion is persistently limited, it will be found that whatever

*I may here emphasize the importance of the position in which the limb is dressed, as one of the most valuable aids to reduction. Weight extension, moreover, is applicable to fractures of the upper limb as well as to those of the thigh and leg, though this fact often is forgotten. I merely mention in passing the value of Steinmann nail extension in fractures of the leg, where the seat of fracture is too low for the ordinary Buck's extension apparatus to be efficient.

range of motion exists is painless, and that arrest of motion at each end of the arc is produced by bony contact. Under such circumstances no increase in the range of motion can be secured except by operation (excision of callus, arthroplasty, etc.). If motion is painful, and it is not arrested by bony contact, improvement may be looked for as the condition of the soft parts returns to normal, under conservative treatment (active movements, light massage, hot-air baking, etc.).

6. *The Propitious Time for Operation.*

It is important to determine as soon as possible after the injury whether or not operation will be required; and the operation, if required, should be undertaken neither too early nor too late. Except

Fig. 14.

Fig. 15.

in the case of severe compound fractures, when the first dressing should assume the character of a formal operation, it is not desirable to operate before the fifth day. But it is possible, almost always, by the tenth day after the accident, to know whether or not operation will be required. This allows time for thorough examination and diagnosis, including the making of the necessary skiagraphs (always in two planes), as well as for attempts at reduction (under an anesthetic if necessary), and for the making of more skiagraphs to learn what has been accomplished.

Operations before the fifth day are more dangerous than those done between the fifth and tenth day, because the condition of the soft parts predisposes them to infection. It is best not to operate until sufficient time has elapsed for subsidence of swelling and commencement of organization of the effused blood. In the case of the femur this may require postponement of the operation for two weeks or even longer. And in any case where the skin is broken (as is frequently the case in fractures of the leg, even when there is not a true compound fracture), it should be the invariable rule not to operate until the skin is soundly healed.

On the other hand, an operation once being determined on, it should not be unduly postponed. It is both more difficult and more dangerous to correct malunion or nonunion by operation than it is to prevent them by the same means. If malunion occurs it is often impossible to overcome the shortening, and the most that can be done is to restore the axis of the limb, or to relieve the soft parts of injurious pressure by excision of exuberant callus, etc.

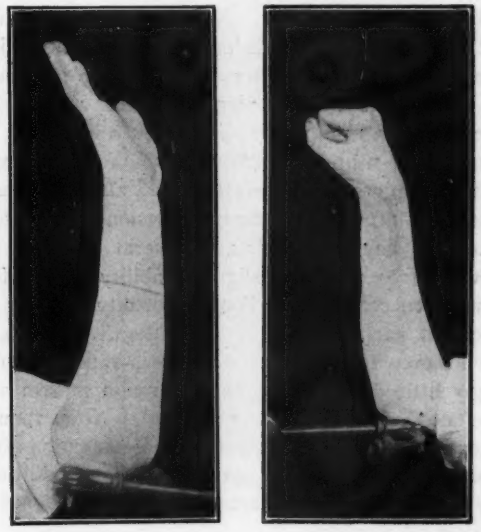

Fig. 16.

Nonunion, except in compound fractures, almost always is due to imperfect reduction of fragments when the fracture was recent. When operation is delayed beyond the second week, there is almost always found more or less osteoporosis of the distal fragment; this renders it difficult to make screws hold in it, and it is often necessary to reinforce the application of a plate by encircling wires.

Hence it is the duty of the modern surgeon to learn and to teach others which classes of injury require primary operation, and which do not. He should not start out with preconceived notions, that all fractures require primary operation, or on the other hand that primary operation is never necessary. Nor should he base his judgment on purely theoretical grounds. I believe the best and safest way to acquire knowledge on this subject is *to study the end-results of fractures,* and to work backward from them until we learn which fractures, and with

what grades of primary and unreduced deformity, give us lasting disability, and which do not.

7. Treatment of Disability following Diaphyseal Fractures.

If operative treatment is required for old diaphyseal fractures it is because of nonunion or because of concurrent lesions of the soft parts, and scarcely ever because of malunion of the bones. This statement embodies the conclusion I have reached by a study of end-results. In the patients who have come under my care for disability following diaphyseal fractures, the disability was clearly due to one of two factors: either nonunion or lesions of the soft parts.

Malunion in a diaphyseal fracture, regarded as affecting the bone itself, may cause (1) shortening, (2) axial or rotatory deformity, or (3) nonunion may be present. Neither malunion nor nonunion of themselves will interfere with the free movements of the neighboring joints. Such limitation of motion, as well as persistent swelling, aches and pains, stiffness in wet weather, etc., almost without exception are due to concurrent lesions of the soft parts. I have cited already several examples to demonstrate the very slight disability which follows even considerable bony deformity, so long as the soft parts are in good condition. Shortening alone, even in the lower extremity, causes surprisingly little disability, so long as union is firm and the axis of the limb is preserved. Now, though shortening of 1 to 3 cm. is sufficiently common after non-operative treatment, axial and rotatory deformity are very rare, and scarcely need be considered as causes of disability.

Nonunion is the chief factor which causes disability in cases of diaphyseal fracture; but it also is comparatively very rare. In all the recent fractures treated by myself, probably approaching a thousand in number, I have never yet had a case of nonunion, except in a few cases of severe compound fracture in which immediate operation was required on account of the condition of the soft parts (Cases 1 and 2 are examples), and in some cases of fracture of the neck of the femur in the aged.

On the other hand, I have seen numerous cases in which lesions of the soft parts were the cause for which the patients sought relief.

CASE VIII: *Malunion of fracture of radius and ulna; paralysis of ulnar nerve.*

Dolores D., aged 13 years, was referred to my service at the Episcopal Hospital Nov. 16, 1914, by Dr. E. E. W. Given. On August 6, 1914, this girl had sustained a fracture of both bones of the left forearm; four weeks after the splints had been removed, and eight weeks after the first accident, she fell again, but did not completely re-fracture the bones. Splints were re-applied for a further period of about four weeks, but after their removal pain and disability persisted, and considerable bony deformity was present. When the child first came under Dr. Given's notice, in November, more than a month after the second injury, there was readily visible bony deformity, and the hand was not only useless, but the seat of constant pain. There was anesthesia and hyperesthesia in the distribution of the ulnar nerve, with wasting of the thenar and hypothenar eminences and of the interosseous muscles.

At operation, November 25, 1914, the ulnar nerve was found caught in scar tissue over the lower end

Fig. 17.

of the upper ulnar fragment (Fig. 10). Union in both radial and ulnar fractures was only fibrous, and resection and plating of both bones was done. Within three days there was evidence of some return of sensation in the ulnar distribution, and by the end of a week sensation was normal. Progress thereafter was uneventful. At the end of four weeks firm union was present, the soft parts had returned to normal, and a fair range of rotation was present.

It appears to me that if proper care had been taken of the soft parts, bony union would have occurred, even after the second injury, in spite of the deformity present; and that this deformity alone would not have been a cause of much disability. Opportunity being afforded for operation, because of the nerve lesion, I believe I was justified in securing better reduction of the fragments.

CASE IX. *Malunion of fracture of radius and ulna; disability from adhesions of the soft parts.*

Joseph P., aged 43 years, was referred to my service at the Episcopal Hospital in February, 1914. Two months previously his hand and forearm had been caught in a cable, fracturing the radius and

ulna above the wrist, and greatly contusing the soft parts. The fractures had united with scarcely any axial displacement, though the lower fragments were displaced toward the extensor surface (Fig. 11). Wrist motion was greatly limited, and though rotation of the forearm was possible through more than half the normal range, the hand was perfectly useless, owing to inability to make a fist (Fig. 13). For more than six months this man was treated by massage and passive motion, with negligible improvement. He then consented to an operation, which was done August 8, 1914, and consisted simply in chipping off the bony angles, and thoroughly freeing the adherent muscles, back and front (Fig. 12). The result was restoration of normal rotation, and very nearly normal movements in the wrist. But it was still impossible for him to make a fist, owing to persisting adhesions in the hand and fingers. Finally, on November 11, 1914, he was again etherized, and these adhesions forcibly ruptured, and the fingers dressed in full flexion. This could not be maintained, however, and when last seen, early in December, 1914, he was still unable to make a tight fist, and therefore to hold a trowel and resume his former work as plasterer, though the condition was probably 75 per cent. better than before operation, and he could still make a living at other work (Fig. 13).

Fig. 18.

In this patient the deformity was by no means so great as to produce disability by itself; and if it had not been for adhesions of the soft parts, I have no doubt that an excellent functional result would have been secured without operation.

8. *Treatment of Disability from Fractures near Joints.*

When a fracture occurs close to a joint, very slight deformity may entail great disability. In the first place it is more important here than in the shaft of a long bone to maintain the axis of the fragments, since less compensatory bone changes can occur when one fragment is very short than when both are of nearly equal length. A slight tilt of the short joint fragment will cause marked deviation of the articular surface. I have already emphasized, perhaps sufficiently, the importance of accurate reduction in these lesions, and have cited cases indicating that in most instances such reduction can be obtained without resort to operation; but I cannot refrain from quoting some further examples which illustrate the very serious disability which follows neglect of accurate reduction.

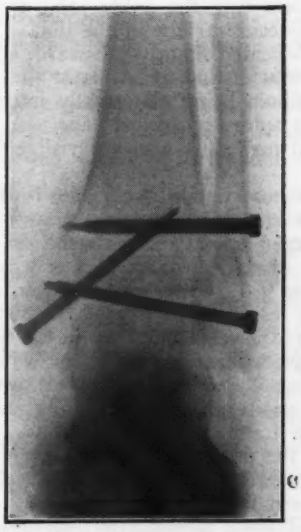

Fig. 19.

CASE X. *Malunion of a Colles' fracture of the radius; median neuritis; resection and screw fixation.*

Anna K., aged 28 years, sustained a Colles' fracture of the right radius June 1, 1914. She was treated by her family physician, who placed the forearm on a straight palmar splint, but made no attempt to "set" the fracture. Over fourteen months after injury this young woman came under my care, complaining not only of the conspicuous deformity (Fig. 16), but of complete disability, from weakness, loss of flexion at the wrist, and sweating and paresthesia in the distribution of the median nerve. She was admitted to my service at the Episcopal Hospital, and I operated October 10, 1914. The carpal fragment was found united by bone to the extensor surface of the diaphysis, while the fractured surface of the diaphysis, free of all bony contact, jutted up against the median nerve and flexor tendons (Fig. 14). Resection and screw fixation restored the parts to normal (Fig. 15), and on December 12, one week after her return to her usual work in a mill, the grateful patient returned to report that she found her hand in every

way as good as it had ever been before the accident (Fig. 16).

CASE XI: *Malunion of fracture at ankle. Resection and screw fixation.*

James C., 31 years old, fractured his left ankle in July, 1914. In September, 1914, he came under my care in the orthopedic service at the Episcopal Hospital, because of persistent disability. He was unable to dorsiflex the foot beyond 90 degrees, and as a consequence had to walk with his whole limb in external rotation, carrying the foot in the coronal plane of the body. Even thus he suffered constant pains along the fibula from the external malleolus upward. A skiagraph (Figs. 17 and 18) showed an unreduced oblique fracture of the lower fifth of the fibula, entering the ankle joint and detaching also the adjacent surface of the tibia. The astragalus was dislocated slightly backward, with the foot, and there was distinct diastasis at the tibio-fibular joint, the fibula being abnormally movable on the tibia in the antero-posterior plane. A fracture of the internal malleolus was not visible in the skiagraph.

I kept this man under observation for two months, hoping that improvement might occur; but he persistently urged operative treatment, on the ground of absolute disability for his former work. Finally, on December 9, 1914, five months after the fracture, I operated, resecting the line of fracture in the fibula, cutting a new groove for it in the tibia, detaching the misplaced internal malleolus (which was now seen to have been fractured) and restoring it to its normal position. The fragments were fixed by three large Lambotte screws. Figs. 19 and 20 show that the posterior displacement of the fibula and astragalus has been overcome, and that the fibula is fixed firmly against the tibia.

Not until eight weeks after operation was this man allowed to bear any weight on his limb. He was then able to walk painlessly and without further disability.

In these and similar cases the proper time for operative reduction of the deformity (if bloodless reduction was impossible) was while the lesions still were recent, and not after malunion had occurred, and the patients had been disabled for months.

9. *Treatment of Non-union.*

As I have already indicated, comparatively few cases of real nonunion have come under my care. The distinction between delayed union and nonunion may be said to be that, in the former, union will occur eventually without operative interference; while in cases of true nonunion the bones remain ununited in spite of all methods of conservative treatment. I think this distinction is important to bear in mind, and believe that the surgeon should not be inclined to rush his patient with delayed union into a possibly very brilliant but by no means necessary operation. I am sure that in a good many of the cases of operative treatment of so-called nonunion now being reported in medical literature, non-operative measures might very well have been effectual in securing bony union, and in as short a time as by operative treatment. I have especially in mind just now delayed union in fracture of the leg; I know of a case of this kind where bony union had not developed at the end of six weeks, and the surgeon at once resorted to bone transplantation. The operation was perfectly successful, and firm bony union developed. But then I recall numerous similar cases of delayed union where the patients developed bony union within a few weeks after being allowed to walk around in their gypsum cases. Of course if there is marked deformity in a case of delayed union, a better end result usually will

Fig. 20.

be secured by operative means, since reduction of the deformity can be obtained at the same time that bony union is encouraged.

But the surgeon must nevertheless stop to consider whether the patient's condition is not good enough as it is, even though firm union is not present. He should remember that bony union does not necessarily follow operation, and that operation may even make the patient's condition worse.

There appears to be little doubt that the most efficient way to secure bony union is to insert a bone transplant. I have recorded elsewhere (Annals of Surgery, 1914, ii, 779) the very satisfactory result obtained by this means in a case of nonunion of the neck of the femur, in a young adult who had been unable to walk without crutches for eight months; and I have also employed it in the forearm. In young children, where the osteogenic powers are so much better than in adults, I prefer,

when nonunion occurs in a joint-fracture (I have operated on three of the external condyle of the humerus), to fix the fragments with sutures or screws, after freshening their surfaces.

Conclusions.

The conclusion of the whole matter seems to me to be a recognition of the fact that it is necessary and always will be necessary, for a large proportion of the profession, who are not trained surgeons, to have cases of fracture under their care. They cannot avoid it. They cannot adopt operative treatment even when it is requisite to prevent disability. The only remedy is to have them so well trained in measures that they can apply, as to enable them to secure the least possible degree of disability.

Then I believe the average surgeon should recognize that the operative treatment of fractures is not as indispensable as some writers would have us believe; and that he should continue in the future, as he has in the past, to give preference to non-operative methods; that he should feel prouder of curing ten patients without disability and without resort to operation, than of recording fifty or one hundred brilliant operations, most of which were really quite unnecessary had he only known enough surgery to make efficient use of non-operative means.

It is important also for the trained surgeon in charge of a case of fracture to be capable of recognizing while the lesion is still recent, whether or not open reduction is requisite. That cases requiring open treatment exist, even the utmost conservatism cannot deny; cases in which it is manifestly impossible to secure any sort of respectable result without operation.

Finally, may I venture to suggest that the patient's interests might perhaps be promoted, if not only the general practitioner but the average general surgeon as well should feel a little more Hallerian diffidence than he does at present about undertaking operations which may have (and frequently have had) such disastrous results as those for fractures of the limbs. Whether a patient will recover, or whether he will die, after such an operation, cannot always be foretold. A very slight lapse in aseptic technic may prove fatal. At all events, there is often a question whether as good a result might not have been obtained without operation. I often recall in this connection that wise maxim of Heister; it may be interpreted either of good or of bad results: *In prædicendis fracturarum eventibus multa utique chirurgis opus est circumspectione.*

SEQUELAE OF MINOR INJURIES INCOMPLETELY SEVERING NERVES OF THE HAND. THEIR SURGICAL TREATMENT.

HAROLD NEUHOF, M.D.,
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Although the immediate and final results of complete division of the nerves to the hand are so well known that any recapitulation is unnecessary, relatively little attention has been devoted to sequelae of partial severance, anatomical or physiological, of these nerves. That insignificant injuries may produce lesions of the nerves to the hand sufficiently painful and incapacitating to require serious attention does not appear to be generally known. Therefore a number of cases that have come under my observation will be described in some detail. Before doing so, the results of incomplete division of nerves should be described briefly.*

The symptoms and signs of incomplete division of a mixed nerve are similar in essential characteristics, whether the injury is sudden (from a wound), or develops gradually (from cicatrix, callus, etc.), whether the incomplete severance is anatomical or physiological. It was formerly believed that such symptoms were chiefly motor. Sherren and others have shown, however, that sensory changes always occur and that motor manifestations, though generally present, need not necessarily follow.

An area of tactile anesthesia is present almost invariably. Within that zone sensibility to pin prick and temperature is generally deficient; it may be intact, however, in some of the slighter injuries, and I wish to place especial emphasis upon this in view of some of the cases I have encountered. Loss of sensibility to touch may therefore be the only sign of injury to a nerve. However, with pronounced sensory changes there are usually motor alterations. Some or all of the muscles supplied by the affected nerve may be paralyzed more or less completely. It may be impossible to distinguish between complete and partial division of a nerve until one or two weeks have elapsed. At the end of that period, however, muscles supplied by the partially severed nerve do not present the *typical* reaction of degeneration, in contradistinction to that of total division. The mode of recovery after incomplete division is also in striking contrast to that following total division. In the latter, sensibility to

*A fuller and more accurate description is to be found in Lewandowsky's Handbuch der Neurologie, Vols. I and II, and in the monograph upon Injuries of the Nerves and Their Treatment, by James Sherren. Many of my remarks are based upon these works; it should be stated that my own experience has been the guide in what I have chosen to say upon certain disputed points.

pain returns long before that to touch; in the former, they return about the same time. Generally the return is far more prompt and complete when a nerve is incompletely severed, for evident reasons.

The sequelae of untreated cases of partial nerve division are of interest in connection with those to be described. Pain is more common than after complete severance and is often more severe. It may be so intense that patients are entirely incapacitated from any work. Pain is frequently associated with skin tenderness in the field of distribution of the injured nerve. It rarely appears directly after the trauma, the quiescent period varying from days to weeks; diagnosis of "hysteria" are not infrequently made because this fact is not recognized. Sensibility to pin prick and temperature generally returns more or less completely, even when treatment has not been instituted, but tactile anesthesia remains, in direct proportion to the extent of the injury. No description is necessary of the trophic changes in the skin and nails that may develop.

Concerning the results of operation for incomplete division of the nerves to the hand it may be said that they are generally good, as far as compression of the musculo-spiral nerve is concerned. No general statement concerning partial severance of other nerves of the hand can be made because the reports in the literature are too scanty. This is particularly true of the group of cases of minor injury, the subject of this paper. The results I have obtained by simple operative treatment have been very satisfactory; they will be described in the individual case reports. Before the latter are presented I wish to repeat that incomplete severance of nerves may result not alone from major injuries leaving well-defined traces, but also from traumata so insignificant that patients recall them with difficulty and attach no importance to them. This is the important point to be gained from the perusal of the case reports.

CASE I: Mary S., 18 years old, servant. For six months has had severe pain in the left thumb almost constantly. It began gradually, is steadily growing worse, and is sometimes violent enough to prevent sleep. Objects held in the left hand are occasionally dropped; the patient has accustomed herself to do all carrying with the right hand. Profuse sweating of the skin of the affected thumb.

Examination: Tactile anesthesia over the entire palmar and lateral aspects of the thumb, less extensive on the extensor surface. (See diagram.) It extends over the thenar eminence and is lost shortly above the radial aspect of the wrist. Small area of thermal and pin prick anesthesia on finger pulp. During examination beads of perspiration appeared over the thenar eminence.

Two inches above the wrist, on the radial side of the flexor surface of the forearm, there is an insignificant, slightly tender short transverse scar. Sensory changes begin shortly below this point. Upon inquiry it was learned that the cicatrix was the result of incision of a small abscess, done about one month before the onset of pain in the thumb.

Diagnosis: Incomplete severance of the radial cutaneous nerve, from an incised wound or from the cicatrix following the abscess.

Operation: Local anesthesia. Vertical incision surrounding scar. This was carefully dissected from the subcutaneous tissues, and found adherent to the radial cutaneous nerve. At the point of attachment the nerve is thickened and firm. About three-eighths of an inch nerve was resected with the cicatrix, and its ends approximated by a single suture; this was covered with a small flap of fat. Suture of wound.

Post-operative course: Prompt relief of pain. Distinct shrinkage of area of tactile anesthesia, after four weeks. Normal sensibility to touch, pain, and temperature, six weeks later, and has so remained to the present time (three years after operation).

CASE II: Jacob S., tailor, 36 years old. Slipped going downstairs and fell upon hypothenar eminence of right hand. For a few days some swelling and tenderness on ulnar side of the wrist and tingling sensations in the little finger. These disappeared and the patient felt well except for some stiffness of the fingers and hand. Pain in the fourth and fifth fingers began about three weeks after the fall. Soon after, weakness in the grasp of the hand was noticed. Pain became progressively more severe and lancinating. The hand gradually became unfit for work, and wasting of thenar and hypothenar eminences were noted. Over this latter pronounced sensitiveness of the skin developed. The man's general condition became seriously undermined. He had been treated for central nervous disease. Wassermann reaction negative.

Examination: Nine months after injury (March 26, 1913). Lesion evidently one involving the ulnar nerve. The skin over the hypothenar eminence and palmar aspect of the little finger is thin and glossy. Both eminences are atrophied moderately; interosseous spaces hollow. Hand grip weakened. Adductor power of thumb markedly diminished. Ability to spread fingers limited. Very pronounced weakness and diminished motion in all the movements of the little finger; to a lesser degree, of the ring finger. No absolute loss of any motion. Tactile anesthesia is a well defined zone over the last two fingers; smaller, ill defined areas of thermal and pain insensibility. (See diagram.) Exquisite tenderness of skin in anesthetic zone. Immediately external to and below the pisiform bone a small area markedly sensitive to pressure; a pea-sized nodule is indistinctly felt here, some distance under the skin. Electrical tests of the affected muscles; no response to interrupted current. Rather sluggish contractions with galvanic current; no "reaction of degeneration."

Diagnosis: Incomplete severance of the ulnar nerve at the pisiform bone, due to pressure. Sec-

ondary inflammatory changes in nerve about the blocked area.

Operation: March, 1913. Curved incision across the wrist. Rather dense scar tissue encountered. Ulnar artery isolated and retracted. Ulnar nerve found free down to a point a little above level of the pisiform. From here to (and slightly including) the division of the nerve into its two branches (the deep and superficial palmar) a quarter inch below the pisiform, the nerve was embedded in inflammatory tissue so dense that its recognition and isolation involved minutest care. When freed the nerve was found compressed; otherwise appeared to be intact. The case seemed one of anatomically disturbed but physiologically blocked conduction. The nerve was covered with sterile vaseline, the scar tissue excised, the wound sutured.

Post-operative course: Prompt disappearance of pain; slight return about three weeks after operation, recurrence lasting several weeks; permanent freedom from pain thereafter. Patient employed electricity and massage very conscientiously, but motor and sensory improvement very slow in first six months after operation. Since then, however, it has been more rapid. Examination, June, 1914: Excellent general condition. No pain. Hand useful for a little work. Tone of skin over thenar and hypothenar eminences much improved. Both are much fuller, less flabby; similar improvement of the interossei. Fair power in spreading fingers, functions of little finger considerably improved, pronounced weakness of adductor power of thumb remains. Area of thermal and pin prick anesthesia gone; that of actile anesthesia much smaller and ill-defined.

In a recent letter (November, 1914) the patient, who lives out of town, writes that there has been steady improvement in range and power of motions, including those of thumb.

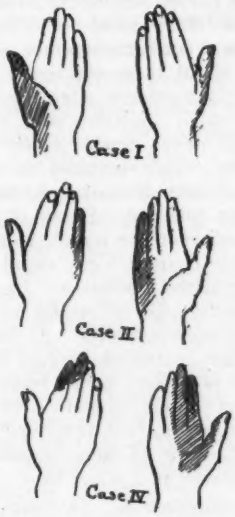
CASE III:* Harry J., 12 years old, came under observation in July, 1911, complaining of pain along the radial side of lower left forearm, of one month's duration. It had become steadily worse, sometimes accompanied by pain along the outer side of the upper forearm and arm. At first no history of trauma was given; only after the examination suggested a nerve lesion and the patient and his mother were carefully questioned was it learned that, some time in the early part of May the boy's left forearm was struck by a baseball (in the region now most painful), a black-and-blue spot remaining for several days.

Examination: Area of exquisite skin sensitiveness beginning about three inches above wrist and extending in a one-inch strip along radial side of anterior surface of forearm to base of thumb. This zone is somewhat hypersensitive to pin prick; nevertheless there are several small patches of tactile anesthesia within it. Possibly slight alteration in thermal sensibility (examination of this small patient rather difficult). No motor changes.

Diagnosis: Contusion of anterior branch of external cutaneous nerve. Operation advised, not accepted at first. Patient returned after three weeks complaining of increased pain despite a variety of therapy. No additional findings.

Operation: Vertical incision at upper level of sensitive skin area. No scar tissue encountered. After considerable search the nerve was found. Slightly thicker and firmer than the remainder of the exposed part for a length of one-half inch almost opposite upper level of the sensitive zone. This portion of the nerve resected. No attempt at suturing the divided nerve, because little or no sensory changes result from division of this branch. Wound sutured.

Post-operative course: Pain as severe as that before operation for about one week, and then gradually disappeared. At examination, one month after operation, patient entirely free from pain, skin sensitiveness gone. Small area of tactile anesthesia immediately below the incision. Patient disappeared from observation soon after, quite well when last seen.



Oblique lines indicate areas of tactile anesthesia.
Cross lines indicate areas of thermal and pain anesthesia.

CASE IV: Charles S., 30 years old, chauffeur. Dull, aching, continuous pain in second and third fingers of right hand for two months. These fingers feel numb and there is the same sensation to a lesser degree in the thumb. Motion of the latter have become "clumsy," although there is no great difficulty in gripping and holding the driving wheel. Pain not improved by varied treatment employed, and, although not progressive, is "getting on his nerves." Upon inquiring into the possibility of trauma, it was learned that, about two weeks before the onset of pain, the anterior surface of the right wrist received a sharp blow from the crank-handle when the engine back-fired. The patient placed no significance upon this, but he could not recall any previous injury in that region.

Examination: Very slight atrophy of thenar eminence. Some weakness in power of moving thumb towards and away from the palm. Tactile anesthesia over the palmar surfaces of the index and

*From the Surgical Department of the Mount Sinai Hospital Dispensary.

middle fingers, to a slight extent on the ulnar aspect of the thumb. The zone extends up the radial side of the palm to a short distance below the wrist. (See diagram.) On the dorsal aspect of the fingers, this zone is limited to the two distal phalanges. Area of insensibility to pain and temperature much smaller. A point of moderate tenderness to pressure on the anterior aspect of the wrist, directly internal to the tendon of the palmaris longus. Deep palpation here results in tingling sensations in the radial half of the hand.

Diagnosis: Contusion, incomplete severance of median nerve at the wrist.

Operation: October, 1914. Local anesthesia. Short vertical incision at tender point (the course of the median nerve at the wrist). Thin fibrous tissue over and rather intimately adherent to nerve. When dissected free, median nerve found congested and enlarged in a fusiform manner at the wrist for a distance of about three-eighths of an inch. In order to relieve the evident edematous condition of the nerve, a small incision was made into the sheath and the nerve fibers gently separated by blunt dissection. This resulted in the escape of some clear fluid and distinct reduction in the size of the fusiform swelling. Small strip of subcutaneous fat placed over the nerve, wound sutured.

Post-operative course: Very rapid improvement, beginning soon after operation. Pain disappeared within two weeks, area of tactile anesthesia began to shrink about one week later. At the present time, two months after operation, patient feels he is completely cured; however, some tactile insensibility over index and middle fingers still remains, and full power has not as yet returned to the thumb. At the present rate of improvement the patient should be quite well in a short time.

CASE V: Abraham K., 51 years old, violinist. A small incised wound of palm of left hand, due to broken glass, was treated and healed promptly about two months before he came under my observation. At the time of injury, tingling in the middle and ring fingers for several days, disappeared for about three weeks, then returned. Return accompanied by burning sensations in these fingers which have become progressively more painful. A certain stiffness of the third and fourth fingers and, to a lesser degree, of the adjoining fingers, has developed, so that the patient has experienced "some loss of delicacy of touch in playing the violin."

Examination: Slightly tender, short, transverse scar between heads of third and fourth metacarpal bones, on the left palm. Shooting pains in middle and ring fingers upon pressure over cicatrix. Skin over the adjoining surfaces of these fingers and their palmar surfaces tender to pressure, hypersensitive to pin prick; there appears to be small spots of tactile anesthesia in this hyperalgesic zone. No motor changes.

Diagnosis: Either complete or incomplete division of the palmar digital branch of the median nerve, severe pain suggesting the latter lesion.

Operation: January, 1914. Local anesthesia. Small vertical incision surrounding scar. Latter deeper in subcutaneous tissues than expected. Cicatrix excised. Search for nerve fruitless. All vestiges of scar tissue removed. Wound sutured.

Post-operative course: Very satisfactory. Pain and paraesthesiae began to clear up soon after operation; stiffness of fingers improved to such an extent in three weeks that patient was able to pursue his professional work with very little discomfort. Examination, two months after operation: Hyperalgesic zone almost gone, a few scattered points remaining; replaced by a zone distinctly hyposensitive to touch and pin prick. About six weeks later, patient reported himself entirely well, but an opportunity for a detailed examination was not obtained.

A number of other instances of injury of the digital nerves has been observed; these were not operated upon, the end-results are unknown, and they will therefore not be reported. However, unoperated cases, observed in the Surgical Department of the Mount Sinai Hospital Dispensary, will be presented because it is of interest in connection with the group of cases under consideration.

CASE VI: Moses C., four years old. Weakness of right hand first observed at age of three. Has been progressive and accompanied by progressive wasting of hand and, to a lesser degree, of forearm. In the beginning frequent complaint of pain in hand and forearm; much less after the first few months. Case appears to have been treated as one of anterior poliomyelitis.

When examination of the arm disclosed a pronounced valgus deformity of the elbow, the mother was questioned about its etiology. She had not noticed it and does not recall any injury. However, when the patient was about two years old, he was treated for "rheumatism" of that joint, the symptoms—pain and swelling—having been of some two weeks' duration.

Examination: Valgus deformity of right elbow not present on left side. A small, firm, slightly tender, subcutaneous mass palpable at inner aspect of right elbow, in the approximate situation of the ulnar nerve. *X*-ray shows that there had been a supracondylar fracture that healed with considerable deformity of the lower end of the humerus.

Since the outcome of this case is unknown (operation refused and patient disappeared from observation), the detailed neurological examination will not be described. The findings were typically those of incomplete severance of the ulnar nerve at the elbow —impaired power of ulnar flexion and adduction, weakness of the interossei and of adduction of thumb, tactile anesthesia and diminished sensibility to pain in ulnar third of hand.

Those cases have been presented in which my notes are complete and in which the end-results of operation could be determined. Although not numerous, they suffice to demonstrate that the nerves of the hand can be incompletely severed by insignificant traumata; that the evidence of such severance is readily found in a routine examination for a nerve lesion; that the sequelae of such injuries may be serious, and that the results of simple operations are often satisfactory.

1275 MADISON AVENUE.

AMBULANT OTITIC MENINGITIS.*

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NEW YORK.

There seems to have been but little written on this subject. This statement must serve as my excuse for presenting the following cases, one in the service of Dr. Wendell C. Phillips, at the Manhattan Eye, Ear and Throat Hospital, operated upon and described by Dr. S. J. Kopetzky, and one operated upon by me in the same institution. To these I have added a few unpublished remarks on seventeen similar cases, including three of my own, by Dr. James G. Dwyer.

R. F. Admitted to the service of Dr. Wendell C. Phillips at the Manhattan Eye, Ear and Throat Hospital and operated upon by Dr. Samuel J. Kopetzky.

Patient underwent a simple mastoid operation in the early spring for acute mastoiditis. The wound healed, leaving a persistent post-auricular fistula, for which the patient was readmitted to the hospital on September 4, 1914, for a plastic operation.

The operation consisted in freshening the wound edges and approximating the skin surfaces and holding them in place with metal sutures.

From September 5 to September 9 nothing out of the ordinary was noted. On the tenth some headache was complained of and the temperature rose during the night to 104.6°.

On September 11 a blood culture found negative. Lumbar puncture gave the following:

Physical: Heavy floculi in clear fluid.

Chemical: Copper reduction present and marked; lactic acid very faint reaction.

Cytology: An occasional lymphocyte present.

Bacterial: Direct smear negative. Culture negative at end of 24 hours.

The temperature ranged between 103° and 105°, with remissions downward. No chills were noted. The pulse remained between 96 and 100, mostly around 80-96. The respirations remained at 24-28.

The only complaint was headache at this time.

On September 15 the abdomen became rigid and there was some stiffness of the back. Widal test negative.

Two hours before the subsequent operations the patient became unconscious.

On September 15 an exploratory operation was undertaken, preceded by lumbar puncture.

The lumbar puncture gave the following results:

Physical: Cloudy fluid.

Chemical: Copper reduction absent; lactic acid present, marked.

Bacterial: Smear revealed streptococci.

The diagnosis of meningitis was thus substantiated.

The exploratory operation showed the following:

Cerebellum explored for abscess and found negative.

Lateral sinus opened and a thrombus found near knee, of small size.

Bleeding obtained from both ends. Jugular therefore not ligated.

Decompression over tegmen and cerebellum.

The patient died September 18. No autopsy.

The case is noteworthy for the following:

1. The failure of the original wound to heal in the normal way after the simple mastoid operation.

2. The patient admitted for a plastic operation and in apparently good health recovers from the effects of this procedure and remains without incident for almost a week.

3. Complains of headache and gives temperature changes which prompt: (a) Blood examination; (b) cerebrospinal fluid examination; and these examinations fail to show anything out of the normal.

4. Two and a half days later lumbar puncture reveals all the evidence of a fully developed streptococcus infection of the meninges; and the exploratory operation reveals a thrombus.

Comment: The meningitis probably had its origin in the infection of the sinus.

July 24, 1914, Mr. X., a well-nourished, large man, 55, consulted me because of difficulty of hearing and a sense of fullness in his left ear. He claimed to have had almost no illness until the slight attack of grippe that put him to bed for several days about five or six weeks previous to his visit to my office. While convalescing from this attack he had been taken with pain in the left ear, which persisted for four days. As it grew better he noticed a slight discharge.

Examination: There was an inconsiderable amount of secretion in the canal and a slight drooping of the posterior superior wall of the left ear. Pressure by probe revealed that this drooping was evidently caused by an exostosis in the canal wall. There was almost no redness of the drum-membrane, which, however, appeared thickened and slightly bulging with a small nipple-like perforation in the posterior superior segment. No pain on pressure over the mastoid. Temperature 99°. No discharge from the nose, which appeared fairly normal. Hearing distance: Akoumeter, 3 inches. Weber to left. CII fork 25/25.

Under local anesthesia a free paracentesis was performed and hot bichloride of mercury irrigations were ordered. A culture was sent to the laboratory of the Manhattan Eye, Ear and Throat Hospital. On July 27 the report on the culture was "Bacillus mucosus capsulatus of Friedlander." My notes at this visit read: "Patient is feeling considerably better; there is only a slight discharge through the drum-membranes. Temperature normal."

Mr. X. was seen daily until August 4. Each day the temperature was normal. At this time the hearing distance had increased to about 9 inches. The patient claimed that he felt decidedly better and

*"Report of Two Cases of Cerebrospinal Meningitis Presenting No Central Nervous Phenomena Until Shortly Before Death." *Transactions American Otological Society*, 1913.

rather objected when I requested him to call the next day.

On August 5 the patient complained of severe pains in the head especially in the vertex. He claimed that he had not slept since two o'clock that morning. Temperature 101.6°. There was absolutely no tenderness about the mastoid and no edema. There was slightly more discharge in the canal. The patient presented an expression of extreme anxiety and looked rather pasty. He was sent to the Manhattan Eye, Ear and Throat Hospital for mastoid operation.

Upon my arrival at the hospital, about two hours later, I found that the pain in the vertex was decidedly worse. The patient complained very bitterly about it. His temperature had risen to 102.5°; and because of experience in two similar cases I decided to examine the cerebrospinal fluid by means of a lumbar puncture. In spite of the fact that no physical sign or symptom pointed to involvement of the cerebrospinal system, the lumbar puncture (which was performed by Dr. J. G. Dwyer) brought forth a milky-colored fluid under pressure. About 10 c.c. were obtained. A hasty microscopical examination revealed pus.

While this examination was being made by Dr. Dwyer I proceeded to perform the mastoid operation. The mastoid process was small and extensively eburnated, excepting in the region of the sinus where the bone was slightly softened. The sinus was freely uncovered and found to be perfectly normal in appearance. There was also slight softening of the bone in the region of the tegmen, where the dura was freely exposed and found to be of perfectly normal appearance. The antrum was extremely small. It contained pus, but no granulations. The posterior canal wall was removed and an exostosis found on it. The internal ear was not disturbed. The patient's condition was bad; his pulse was very rapid and weak, and it was considered inadvisable to open the dura. Dr. Dwyer injected 45 grains of urotropin into the spinal canal, whereupon the pulse regained considerable of its fullness and regularity.

The following morning the patient complained much of pain in the vertex. Cerebration was somewhat delayed, but his answers were clear, and Kernig and Babinsky tests were negative. His temperature rose to 104°, and that night he gradually went into a state of coma, in which he died on August 7. A post-mortem examination was not allowed. Examination through the wound failed to reveal any abscess in the brain.

Dr. Dwyer's report on the cerebrospinal fluid was as follows:

Physical: A turbid fluid; heavy precipitate upon centrifuging.

Chemical: Copper reduction absent; lactic acid present.

Bacterial: Bacillus mucosus capsulatus of Friedlander.

Culture: The same organism.

Cytological: Mainly polynuclear; some large mononuclear.

The case is remarkable because of:

1. The normal temperature for 11 days, *i. e.*, until two days before death.

2. No visible point of entrance of the infection from the middle ear or mastoid.

3. Complete lack of clinical symptoms until the headache and elevation of temperature appeared, only a few hours before the cerebrospinal fluid was found to be milky, indicating either an extremely rapid infection, or that the infection of the meninges had been present a considerable length of time, perhaps days.

Dr. James G. Dwyer allows me to quote from an unpublished paper the following:

"During the past two years there have come under the notice of the writer seventeen cases of meningitis, in which the only method of diagnosis was by lumbar puncture, as none of these cases presented the clinical picture of meningitis so that the diagnosis could not be made by the usual means, that is, the usual clinical means. In many of the cases it was only in the routine bacteriological and cytological examinations that the condition was diagnosed. In most of these cases, as far as could be gleaned from their histories, and as far as could be judged from the cerebrospinal fluid, the meningitis had lasted for as long as two weeks, the patient going about his ordinary business as usual; and it was only when coma or delirium supervened that attention was directed to the meninges. In none of these cases were any of the ordinary symptoms present; the leucocyte and differential count were above the normal, but not like that found in the fulminating or classical type. There were no symptoms of pressure; in short, were it not for the cerebrospinal fluid findings, the patient would seem to be on the road to recovery. It was noted that in some few of the cases operative interference seemed to change the character to a more active form, but this was not always noted, and several of the patients died in full consciousness.

"All of these cases showed capsuled organisms; the majority showed streptococcus mucosus capsulatus, and two showed the bacillus mucosus capsulatus or Friedlander bacillus. In all, the fluid was very turbid just before death, and in most from the beginning. All of the usual tests—chemical, bacteriological and cytological—were done on these fluids, so that the whole presents a very interesting and instructure picture.

"These cases are reported because is shows the necessity of routine laboratory aids and draws our attention to a particular form of meningitis which, while answering to the general characteristics of meningitis as we know it from the laboratory standpoint, gives us no clue as to the actual condition

present from the clinical standpoint; and the early recognition of this will at least help us in our prognosis if in no other way. It also shows the necessity of cultures being taken in all of our operative cases; and if any of these capsuled organisms are found, our attention will be directed more quickly to any possible complication.

"The question arises, Why do we have this picture with this group of organisms? The answer is hard to find, but we must remember that an organism with a capsule is very highly protected against the action of the anti-bodies, that the capsule acts as a protective wall to the organism and thus hinders to a certain extent the ordinary protective factors."

As I said before the Otological Society two years ago,† the only reference I could find in literature to this class of cases is that by Brieger, quoted by Preysing in the *Transaction of the German Otological Association,* 1912; and I take the liberty of again using the same quotation:

"In many cases of suppurative meningitis we see all the symptoms disappear after opening the labyrinth and after repeated lumbar puncture. I have seen such cases, which appeared almost in the last stages, seemingly completely recover. They got up out of bed, walked about, felt perfectly well; and we were astounded to see that within a few hours after a condition of apparent complete well-being, death should supervene. Autopsy revealed that in some cases there occurred in parts of the subarachnoid space, inaccessible to lumbar puncture or to other exploratory methods, a widespread plastic infiltration, while in other cases there existed, in addition to these localized infiltrations, diffuse inflammation of the meninges."

It seems, then, that there is a type of *meningitis purulenta,* which from its complete lack of symptoms is quite distinct from the picture we usually find in the text-books and rarely in the general literature on the subject. If we can accept the term "ambulant typhoid," why not call this "ambulant meningitis"?

These cases teach the necessity for bacterial examination, and accent the fact of the gravity of infections due to capsuled organisms. Headache, though not severe, in the presence of a discharging ear, should excite our gravest fears. Lumbar puncture, though perhaps an admission of weakness of our diagnostic skill, must be resorted to in order to establish a diagnosis; and will prove invaluable in forming a correct prognosis.

35 PARK AVENUE.

†Read before the *Eastern Section of the American Laryngological, Rhinological and Otological Society.*

TOTAL RHINOPLASTY: A CASE REPORT.

RICHARD H. JOHNSTON, M.D.,
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In November, 1913, I was consulted by R. A., 25 years old, native of Canada, who gave the following history: Up to the time of his accident he had been generally healthy. He had had no venereal disease. Three years before I saw him, while working in a saw-mill, he was drawn against the saw in a manner which he could not explain. He thought he was sucked down by the force of the saw. In falling he threw his head to the right, which probably saved his life. The left biceps muscle was removed to the humerus; the nose was

Fig. 1.

cut entirely off, the lower lip was cut off to the lower border of the inferior maxilla, while the upper lip was cut through to the right of the middle line and hung down on the right side. The left upper lip was cut away from the bone, the forehead had several cuts on the left, and the left cheek was cut into ribbons. Unfortunately, the physician who saw him afterwards did not re-attach the nose, although it was found and preserved for some time. He sutured the cheek, forehead, and upper lip. Nothing was done to the lower lip, which was completely cut away, as described. The patient was removed to a hospital, where for a time his condition was critical. After five months he was able to go to his home, where for a year he was practically an invalid. During this time he had no control over his lower lip, so that saliva constantly dribbled from his mouth. After his recovery his appearance prevented his getting a position.

When I saw the patient his condition was as follows: The nose was shaved off on the left side even with his cheek, while on the right a slight projection of bone and cartilage could be seen. The mucus membrane of the interior of the nose was exposed, revealing what was left of the bony septum and the inferior and middle turbinated bodies. The mucous membrane still performed its function and preserved its glistening appearance after an exposure to the atmosphere of three years. To hide the deformity the patient wore a gauze shield. The scars in the forehead and cheek were distinct. The left eye could not be entirely closed because of the scar on the upper lid. The lower lip was made up entirely of scar tissue, which was tightly

Fig. 2. xx—Cartilage under the skin. aaa—Line of on which skin was later dissected up and turned into opening. bbb—Flap for making new nose.

adherent to the bone from the teeth, which were exposed to the mental process. The upper lip showed a hare-lip to the right of the center, exposing the teeth; the scar tissue was not so extensive as in the lower lip. All these lesions are shown in photograph 1.

Because of the numerous scars on the face I proposed to plant a piece of cartilage under the skin of the left forearm and two months later to transplant the flap to the remains of the nose. When I explained to the patient that the arm would have to be held in a cramped position for two or three weeks before cutting the flap away, he refused to submit to it. He insisted that the flap be taken from the forehead, though it would add another scar.

On December 29, 1913, I exposed the left eighth rib and removed a piece of cartilage, 1.3 inches long, which was pared down to a thickness of 5mm. and notched slightly ⅜ of an inch from one end. An incision was then made through skin and periosteum a little above the center of the left forehead, 1.2 inches from the middle line. With a sharp elevator the periosteum was raised from the bone and the cartilage slipped underneath it. The skin was then sutured. The transplantation of the cartilage is shown in photograph 2.

In order to allow plenty of time for the cartilage to attach itself to periosteum, the final operation for the restoration of the nose was delayed until March 12, 1914. The first step in the second operation was dissecting up the skin on the two sides of the remains of the nose (Fig. 2). The flaps

Fig. 3.

were turned into the facial opening, skin surface down and sutured in the middle line so that the raw surfaces would quickly unite with the raw surfaces to be brought down from the forehead. The skin flaps helped also to form a foundation upon which the new nose was to be built. The flap for the formation of the nose began at the inner end of the right eyebrow and continued up to the hair line and then across the forehead to the end of the transplanted cartilage; from this point it passed downward and inward above the left eyebrow to the root of the nose. The skin was dissected away from the periosteum up to the cartilage, which was removed from the bone with its strip of attached periosteum. The flap was then turned down with raw surface below. The upper end of the cartilage was stitched above to hold it stationary, while below it was bent at the notch referred to above so that the lower end was sutured into an incision of the

upper lip, the nose would project from the face. The flap was split in the middle line up to the cartilage. After this was done the two edges of the flap were sutured to the raw surfaces on the sides. The two lower flaps, formed by splitting the skin to the cartilage, were turned up into the nostrils and held in place by pieces of rubber tubing inserted on each side of the cartilage. The flap from the forehead was made large to allow for shrinkage and because the patient wanted a large nose, which was a family characteristic. The flap was nourished by the bridge of skin left between the eyebrow. The nose was covered with iodoformized gauze held in place with adhesive strips.

The first dressing was made five days later and

Fig. 4.

the nose was found in good condition with sensation highly developed. The stitches were removed on the twelfth day. On April 28 the wound of the forehead was scraped and covered with Thiersch skin grafts from the inner thigh; two of them took well, but the third sloughed. To build up the lips and to give the patient a mouth with which to eat and to talk properly, many operations were required because of the excessive amount of scar tissue.

The final result of the operations is shown in photographs 3 and 4. While the new nose is by no means perfect, the foundation is such that successful operations to shape it and to reduce its size can be done at any time. After having had no nose for three years, the patient was well satisfied with the result.

807 NORTH CHARLES STREET.

HEMATOMA IN THE FALLOPIAN TUBE WITH PROLONGED UTERINE HEMORRHAGE: A CASE REPORT.

E. M. MIERS, M.D.,
HARPER, KANSAS.

Mrs. K., housewife, age 27, entered the Walker Hospital at Anthony, Kansas, December 22, 1914. She had always been well except that she had long had leucorrhea. Soon after her marriage dysuria developed and the leucorrhea increased, staining her clothes. She was married at 19, has two living children. Her father died of apoplexy; the remaining family history is of no interest.

Three years ago she had a miscarriage at seven months; and nine months later another miscarriage at six months. Two years ago she was suddenly seized with pain in the back and lower right iliac region; she began flowing at once, not severely but with small clots and watery blood. She had chills and fever. A physician diagnosed appendicitis. With this attack she was confined to her bed for two days, after which she felt well, but had recurring pains, which she said were like colic, sometimes lasting a minute and at other times an hour. She flowed constantly from this attack to the time of admittance to the hospital, a period of two years, the flow consisting of small black clots, the size of a pea, and watery blood, necessitating her wearing a napkin constantly. At her menstrual periods, which were regular, there was a profuse flow lasting six to nine days, with much pain, with bearing-down sensations.

What was the cause of the hemorrhage? Could this woman have had an extra-uterine pregnancy with hemorrhage from the uterus? The history of the case would indicate this, but the duration of the existing conditions, the constant hemorrhage, and the absence of shock would not support this conclusion. Can we connect the early marital symptoms—increased discharge, dysuria, and dull bearing-down pain—with secondary salpingitis due to gonorrheal infection, which the husband admits having? This would account for the dysmenorrhea and peculiar colicky pain, but what of the hemorrhage? Could the pus cause an erosion of the mucous membrane with oozing hemorrhage in tube and uterus?

Physical examination: A frail, weak, emaciated patient. Two years ago she weighed 118 pounds, now she weighs 83 pounds; pupils widely dilated, reacting to light normally; pulse 132; temperature normal; anxious expression; chest negative; abdomen flat; pain on deep pressure over right iliac low

down; no rigidity; *vaginal examination* showed small clots of blood and watery blood; also purulent mucous exudate; no external tears or abnormality; cervix slightly lacerated, soft and admitting little finger; uterus somewhat enlarged, movable, normal position; left tube and ovary apparently normal. There was a mass in the right side, quite large, movable and not very tender. Abdomen otherwise negative. Urine negative.

In all cases of extra-uterine gestation are found symptoms that simulate normal pregnancy, of which she had none. In ectopic gestation there is usually a history of long standing sterility with manifestations of endometritis, suppressed menses, increase in size of the abdomen and breasts, and digestive disturbances, such as nausea and vomiting, occurring at an early date. There are two signs suggestive of ectopic gestation: "First, bloody discharge; second, peritonitic phenomena." The latter present themselves with pain, more or less sharp, in the lower abdomen, radiating to the loins and back and recurring at every menstrual period, simulating in a degree labor pains, accompanied by enlargement of the abdomen, very sensitive to pressure and requiring the patient to go to bed. The bloody discharge is often accompanied by expulsion of the decidua in part or complete. This condition is often diagnosed miscarriage. A tumor situated on either side of the uterus, or posteriorly, is only pathognomic of tubal gestation when accompanied by sharp, colicky, localized, recurrent pain, history of sterility, signs of pregnancy, and—if ruptured—by the usual signs of hemorrhage, with faintness and rapid pulse. This simulates our case if we disregard the long duration of the symptoms, although I cannot tell the length of time this mass had existed. The history would lead one to suspect ectopic gestation from the start.

I operated December 26. Opening the abdomen revealed considerable free fluid—bloody serum with clots in Douglas' cul-de-sac. The left ovary and tube were normal; the right tube was sausage-shaped, five inches long, and of a diameter about that of a silver dollar. The tube was ruptured on the upper surface near the fimbriated extremity, and contained a large black clot of blood. The right ovary was cystic and contained a hematoma. Tube and ovary were removed. The patient made a good recovery, and all symptoms disappeared.

Probably this was a case of ectopic gestation with expulsion of the decidua and fetus either through the uterus or into the peritoneal cavity with absorption; at any rate, no trace of them was found. I think, however, that we cannot exclude the possibility that salpingitis might have caused an erosion of the mucous membrane, producing an oozing hemorrhage and formation of clots.

THE MISUSE OF THE CATHETER IN CORRECTING OSSICULAR RIGIDITY.

An experience of years with catheter-inflation has convinced me that the frequent routine use of the catheter *as a means of correcting ossicular rigidity* is based on a false conception of the mechanism involved. The theory on which it is used is, of course, obvious, viz., that the act of inflation moves the drum membrane and with it the ossicles, thereby tending to restore their normal mobility. The beginner in otology is often enthusiastic over the distinct functional gain following a first or second inflation, and is at a loss to explain his failure by the same means to obtain continued and progressive improvement of hearing. The explanation of this phenomenon is that the first few inflations in the case of an individual whose ears have not been under recent treatment often do result in the breaking or at least modifying of small intratympanic adhesions, with consequent improvement of sound transmission. If continued as a routine measure the force of the inflations are exerted more and more in the direction of stretching the drum membrane while exerting progressively less influence on the ossicular chain. Used too frequently or too forcibly, and continued over a considerable period of time, the net result is a disturbance of the tone or balance of the conducting mechanism far outweighing the influence of the comparatively small movements of the ossicular chain.—PHILIP KERRISON in *The J. A. M. A.*

RENAL INFECTION.

In the hyperacute and even in many of the acute and chronic cases of renal infection, the local signs are often completely masked by the general symptoms of septic intoxication or by the even more common fact of the patient's referring all the symptoms to the bladder; and thus those who do not know some of the multicolored garments under which renal infection disguises itself are apt to overlook the golden period at which the kidney itself, the real seat of the trouble, might receive aid and thus avert either complete destruction of the organ of one side, or prevent the spread of the infection to the other.—D. N. EISENDRATH in the *Interstate Medical Journal.*

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, APRIL, 1915.

SIMPLE METHODS OF BLOOD TRANSFUSION.

The transfusion of blood has been amply established in therapeutic value in a variety of conditions; and yet, because of the technical difficulties in the operation that have heretofore obtained, the procedure has not come into that general employment which its often life-saving service deserves. Technically, the easiest method of transferring the blood was, until recently, the syringe method of Lindeman. But that, too, is very far from simple; it requires a very nice technic, trained assistants, and numerous expensive, easily-broken syringes. Without very great care the cannulae, frequently handled and pushed and pulled upon by the syringes, are apt to become dislodged; and clotting in syringe or cannula is often the experience of the inexpert.

Recently Lester J. Unger, an interne in Mt. Sinai Hospital, New York, has greatly simplified the syringe transfusion method, reducing the number of syringes to two, obviating the handling of the cannulae, and so accelerating the procedure that a thousand cubic centimeters of blood can readily be transferred in five minutes. To accomplish this he uses a double two-way stop-cock.

As described by him in the *Journal of the American Medical Association,* February 13, 1915, "it is a stop-cock, which alternately connects a syringe for blood to the donor and at the same time a syringe with saline to the recipient; then by turning the cock the syringe with blood is immediately connected to the recipient and the syringe with saline to the donor."

The 20 c.c. syringe for aspirating and injecting the blood fits directly into an opening in the small current-directing mechanism; the recipient's and donor's cannulae and the syringe for saline solution (a single barrelful is sufficient for the transfusion) are connected with this switching mechanism by paraffined rubber tubes. It will be readily seen that the employment of this apparatus, which requires no special skill, is vastly simpler than transfusion by the method of Lindeman or by the anastomosing of blood-vessels with sutures (Carrel), or special cannulae (Crile, Elsberg, Soresi).

But in order that the transfusion of blood may be employed whenever and wherever emergencies may require it, it must be possible not only without any special skill, but also without any special apparatus. In other words, it must be as readily performable as an intravenous saline infusion, the few paraphernalia for which are everywhere easily procurable. That transfusion may be reduced to the same simple procedure as infusion, it is only necessary to keep the blood fluid. To accomplish this defribination has been employed, which, however, deprives the blood of important constituents. The search for a safe anticoagulant therefore suggested itself. Leech extract (hirudin) is too toxic if mixed in sufficient amount to prevent clotting of the whole blood used (Satterlee and Hooker used it in small amounts to prevent clotting in syringes). Sodium citrate, much used in laboratory tests as an anticoagulant, was found safe in the necessary amount (0.02%) by Hustin of Brussels, who reported (*Annales et Bulletin de la Société Royale des Sciences Médicales,* May, 1914) the successful injection into a patient of blood mixed with a solution of sodium citrate and glucose.

Without knowledge of Hustin's work or of each other's, two New York investigators, Richard Weil and Richard Lewisohn, also, and simultaneously, arrived at the employment of sodium citrate as the means of simplifying transfusion by maintaining the fluidity of the blood. They both found, too, that, curiously enough, the sodium citrate introduced with the donor's into the recipient's blood does not reduce the coagulability of the latter (which would be a serious objection in many cases) but actually increases it.

Weil reported (*Journal of the American Medical Association,* January 30, 1915) the syringe injection into human patients of small amounts of blood (10 to 350 c.c.) kept fluid, in an ice-box, by a 1% admixture of sodium citrate.

Lewisohn went further. He transfused larger amounts (1,000 to 1,200 c.c.) of fresh blood mixed with a solution of sodium citrate to form a 0.2% dilution of the latter, which, like Hustin, he found by experiment sufficient to keep the blood fluid 48 hours or more. Lewisohn's method is exceedingly simple, obviating even the use of syringes. As described in the *Medical Record,* January 23, 1915, he allows the blood to run from the donor's vein through an ordinary cannula or large needle into a glass jar, containing five c.c. of 10% sodium citrate solution. While the blood is running into the jar it is stirred with a glass rod to effect a good mixture of blood and citrate solution. The blood is then poured into an ordinary glass funnel or salvarsan jar which is connected by a piece of rubber tubing with the cannula or needle in the recipient's vein. Surely a simple method of transfusion—quite as simple as, if not more simple than, the intravenous injection of salvarsan.

Accumulating experience has thus far shown no danger in the use of citrate blood and it appears to be quite as effectual as unmixed blood. In addition to its great simplicity, the transfusion of citrated blood has the advantage over Crile's method that, like Lindeman's and Unger's, the amount of blood introduced can be accurately measured, and it has the further advantage over all these methods that it can be conducted leisurely and without the simultaneous presence of donor and donee—indeed, the blood can be carried from the donor's home to the patient's.

It is interesting to note that there has appeared another claimant for honors in the transfusion of citrated blood. In the *Medical Record,* February 27, 1915, G. A. Rueck of New York says that he conceived the idea in January, 1914, and carried it out experimentally on rabbits in that month, and in May, 1914, injected a patient with 250 c.c. of a blood-saline solution—sodium citrate mixture. On these accounts he "claims to be the originator of this method of blood transfusion"—which quite ignores Hustin (another indignity to Belgium!)

Blood transfusion has at last been transformed from a tedious, delicate, and often difficult surgical operation to a simple procedure that can be conducted almost anywhere and by any physician.

With Unger's apparatus unmixed blood can be readily and quickly transferred from one person to another. Without that, or any special apparatus, citrated blood, which appears to be equally serviceable, can be transferred by the method of Lewisohn—to date the simplest of all transfusion procedures. —W. M. B.

Surgical Suggestions

Do not be hasty in urging operation for exophthalmic goiter. Even bad cases sometimes recover completely under conservative treatment.

When cough, emaciation, fever, and hemoptysis are not associated with tubercle bacilli in the sputum, consider neoplasm of the lung. Metastastic sarcoma of the lung may give the same physical signs of localized tuberculosis.

In all varieties of acute tubal and adnexal infection radical operation is often unnecessary and undesirable. Many so-called "pus-tubes" get well without operation or subside into a chronic state.

Pure forward subluxation of the head of the humerus can occur from mild violence and it is one of the occasional causes of shoulder disability. It is reduced by abduction, and continuous abduction for two weeks will cure it.

Keeping tally of the pads and sponges used and discarded during a laparotomy puts a serious responsibility and a great strain upon the nurses and always carries the chance of an error in calculation. Moreover, if a sponge or pad is unaccounted for it entails a manual search among the patient's viscera and in the pile of discards. It is simpler and safer to leave no untaped sponge entirely within the cavity, even for a brief period, and to use as pads and packings only those that are long enough to so far protrude from the wound that they cannot be lost.

The following is a very simple and often surprisingly effective method of securing abduction in the treatment of shoulder disability: In a semi-recumbent position in bed the patient abducts his arm on the pillow as much as he comfortably can. A bandage sling is looped lightly about the wrist or the elbow at one end and tied to the head of the bed at the other. The head of the bed is then raised on chairs. As the patient gradually slides down, the arm travels (relatively) up alongside his head. By this means persistent and marked abduction disability is sometimes cured in twenty-four hours.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

CANCER AND THE SIMPLE LIFE.

The ravages of cancer continue to excite interest and research while the death rate apparently continues to advance. During 1913, cancer and other malignant tumors caused 49,928 deaths in the registration area, corresponding to the death rate of 78.9 per hundred thousand population. The rapidity with which the mortality rate from this disease has increased is well evidenced by the fact that the death rate per hundred thousand population in 1900 was only 63. It is undoubtedly true that a considerable proportion of this increase is due to improvement in diagnostic methods and more frequent operations with the definite diagnosis established on the operating table.

When it is appreciated that since 1900 the death rate from tuberculosis of all forms has decreased from 201.9 to 147.6 in 1913, while the typhoid mortality has fallen during the same period of time from 35.9 to 17.9, it is patent that some unusual process is developing in the community making for a higher mortality from malignant diseases, while infectious diseases are apparently coming under the control of modern sanitary science.

The general attitude towards carcinoma has been to recognize it as a surgical condition demanding prompt attention, and stress has been placed upon the importance and necessity of early diagnosis. Bulkley, in his recent book on Cancer, registers his objections to considering malignant tumors as surgical conditions and indicates that inadequate attention has been given to the medical considerations involved before and after operation. It is timely to draw attention to the fact that operations merely remove the results of the disease and that the application of the *x*-ray, radium, caustics, and various other procedures fails to reach the root of the difficulty.

It is true that traumatism is not the whole cause of cancer, and that its parasitic origin has not been demonstrated. The definite place of heredity and occupation in the etiology of cancer has not been ascertained. Similarly, it is true that carcinoma is not limited to the aged nor does it spend its effects upon any particular sex, race, or class of persons, nor in any particular section of the world.

In view of the negative results which thus far have attended our researches, Bulkley arrives at the conclusion that deranged metabolism is "the only possible etiological element."

It may be true that the incidence of cancer appear to increase along the line of modern civilization, but it does not necessarily follow that there is any distinct relation between our civilization and cancer growth. The facts that living conditions are more complex, that the consumption of coffee, meat, and alcoholic beverages appears to be increasing, and that living is more of a nerve strain than in previous decades, hardly suffice to indicate a casual relation. It might be equally true that the incidence of cancer has increased in direct proportion with the increase of the wheat crop or the production of gold.

The dangers of argument by post hocs are everywhere recognized. It is possible that as great errors may be committed in judging modern living conditions to be the cause of cancer as in the ancient view that malaria was merely a form of paludism or yellow fever was caused by vitiated air.

In the United States economic conditions vary considerably and standards of living must naturally be altered by the degree of prosperity. The stress and strains of living will vary in different States of the Union according to the industries employing the bulk of the population. Similarly, the relative differences between living in cities and rural sections ought to evidence some relation to the cancer mortality providing the incidence of cancer is largely dependent upon the conditions under which people live.

In considering the cancer mortality rate of the United States the only really significant fact evidenced is that it appears to be lower among the colored people than among the white. For example, the death rate from cancer in 1913 for the registration area was 78.9, but for the whites it was 80 and for the colored 57.3 Contrasting the cities in the registration areas, the total mortality rate was 87.8, for the whites 88.4 and colored 72.9. In the rural parts of the registration States the total mortality 69.4, for the whites 70.7 and for the colored 42.2. Here is an opportunity for bio-chemistry to investigate the differences between the wh e and the colored which induces a possibly greater immunity on the part of the colored people.

From these same figures, it is also significant that the mortality rate from cancer appears to be higher both for the white and colored population in cities than in rural parts of registration States. This need not necessarily indicate, however, that the complex living of the city is responsible for the higher mortality rate from cancer or that it possesses any specific casual relation to it. The relative mortality in urban districts as compared to rural districts holds true for all causes of mortality and is particularly noticeable in such diseases as measles, scarlet fever, diphtheria, tuberculosis, rheumatism, meningitis, bronchitis, diarrhea, appendicitis, hernia, cirrhosis of the liver, Bright's disease, puerperal fever, congenital debility, and even suicide. It is, therefore, suggestive that, while the rural sections of the community apparently possess a lower mortality rate for many diseases, the underlying conditions incident to this fact are general in their nature and in no wise specifically related to any single disease.

Bulkley makes the following statement: "The simple life, with the avoidance of the dietetic and other causes which have been found to induce cancer in nations and individuals, promises the best hope for the arrest of the rapidly increasing development of cancer throughout the world." While it is undoubtedly true that the return to the simple

life might cause a decrease in many of the diseases due to dietetic irregularities and metabolic inactivities, it still remains to be shown that this simplicity of living will decrease the cancer morbidity more than that of any other cause of death.

Until the cause of tuberculosis was demonstrated, heredity was held to be as important a factor in its etiology as unsanitary living conditions. When modern science eventually discovers the causative factor of cancer, it will be possible to decrease the morbidity which will lead to a fall in the mortality rate. Until such an epoch-making discovery is achieved, early diagnosis and prompt surgical attention is the most satisfactory procedure for attacking the huge problem. It may be true that fully ninety per cent. of those who have once been affected with cancer die of it. It is also indubitable that the general mortality rate from this disease is increasing despite of our surgery, but longer periods of life are granted to those who submit to the early operations than would be possible without such operative procedures.

It is most reasonable to believe that various forms of medical and dietetic treatment, now empirical in nature, may have a distinct influence upon carcinoma. If abstinence from meat or a full vegetarian diet is productive of a greater resistance to carcinoma, a most interesting field of investigation is open in order to ascertain the reason for the increased resistance to the disease. Until, however, some direct causal relation is demonstrated between diet and cancer, communities are safer in clinging to the belief that immediate surgery is of greater value than experimentation with variable systems of dietetics. Modern surgery is a palliative of cancer, occasionally a cure for cancer, and may be in a few selected instances a preventive of cancer, although the last is never susceptible of proof.

Book Reviews

Obstetric Nursing. A Manual for Nurses and Students and Practitioners of Medicine. By CHARLES SUMMER BACON, Ph.B., M.D., Professor of Obstetrics, University of Illinois and the Chicago Polyclinic. Duodecimo; 355 pages; 123 illustrations. Philadelphia and New York: LEA & FEBIGER, 1915.

It is a pleasure to have read this book. The reviewer knows no book in the English language dealing with this subject that has so much received the personal touch of the author. The title of the book is very modest. While primarily written for nurses, it is safe to say that all physicians may read it with a great deal of profit to themselves and not a little benefit to the patient. The three opening chapters deal with the duties of the nurse to herself, to the physician, and to the patient. The advice given cannot fail to improve the efficiency of the average nurse, The entire domain of obstetrics is covered from the viewpoint of caring for the obstetric patient and her infant. While an exhaustive description is not given of the physiology, the pathology, and operative technic, the book is nevertheless complete in important practical detail. The little work breathes cleanliness; it savors of the spirit of Oliver Wendell Holmes and clean obstetric nursing.

A Student's Manual of Gynecology. By JOHN OSBORN POLAK, M.Sc., M.D., F.A.C.S., Professor of Obstetrics and Gynecology, Long Island Medical College. Duodecimo; 414 pages; 100 engravings and 9 colored plates. Philadelphia and New York: LEA & FEBIGER, 1915. Cloth, $3.00 net.

For students who desire to get the outlines of gynecology briefly and tersely stated and at the same time to become conversant with most of the items of gynecologic disease, the little volume of Polak's is capital. The author's large experience is boiled down into exceedingly compact chapters; diagnostic hints and surgical indications are stated in the clearest and most practical terms. Illustrations are particularly descriptive of operative procedures. The book's chief virtue is clearness; students are not apt to be puzzled about the conditions described; its fault lies in the rather false impression it may give students that pathology is a finished subject of which all the facts are cut and dried and finally established.

Selected Addresses on Subjects Relating to Education, Biography, Travel, etc. By JAMES TYSON, M.D., LL.D., Professor of Medicine, Emeritus, University of Pennsylvania. Duodecimo; 358 pages. Philadelphia: P. BLAKISTON'S SON & Co., 1914.

The essays reprinted in this volume cover a wide range. Without carrying any large message or distinguished by unusual depth of thought, they afford pleasant and wholesome reading. The style is simple and unpretentious. We noted one or two mistakes. On page 335, the date of the discovery of the spirocheta pallida is given as 1884 instead of 1904. Also on page 326 Ross—and not Reed—is mentioned as one of the discoverers of the mosquito etiology of yellow fever.

The Heart in Early Life. By G. A. SUTHERLAND, M.D., F.R.C.P.; Senior Physician to the Hampstead and North West London Hospital; Physician to Paddington Green Children's Hospital. Duodecimo; 207 pages. London: HENRY FROWDE, OXFORD UNIVERSITY PRESS; HODDER AND STOUGHTON, 1914.

Sutherland divides his work into three main parts: 1. Functional cardiac disturbances. 2. Paroxysmal tachycardia. 3. Organic heart disease. It is in the first part that we must seek whatever justification the special title of the book holds, for the reason that most of the functional disturbances that affect hearts occur in the young. The author discusses the various forms of arrhythmia, tachycardia and bradycardia. We had expected an extended discussion of congenital heart disease, but this subject, except in relation to certain murmurs, is strangely missing. In the chapter upon the uses of digitalis, the indications are not given with sufficient precision. There is also no mention of the now comparatively common form of heart disease, the subacute infectious variety or endocarditis lenta; nor is there any mention of the common cardiac disturbances in the young associated with orthostatic albuminuria. The discussion of the subject is on broad lines and is tempered with sound judgment. The exposition is thoroughly modern and is based largely upon the work of Mackenzie and his pupils.

The Difficulties and Emergencies of Obstetric Practice. By COMYNS BERKELEY and VICTOR BONNEY. *2nd Edition.* Octavo; 807 pages; 302 illustrations. Philadelphia: P. BLAKISTON'S SON & Co., 1915. Price $7.50.

This book was reviewed in these columns about a year ago. We were then glad to recommend it. The second revised edition is heartily welcome. Apart from its lucid style and completeness, it is invaluable as an expression of a very large personal experience of the two authors.

The Philosophy of Radio-Activity or Selective Involution. By EUGENE COLEMAN SAVIDGE, M.D., New York. Octavo; 151 pages. New York: THE WILLIAM R. JENKINS COMPANY, 1914. Price $1.50.

The book treats radio-activity not in the sense commonly understood by medical men, but rather in a broad, com-

parative, philosophic way. For the student of philosophy the book should prove of interest. For the average medical practitioner and even *x*-ray specialist it will be of slight, if any, practical value.

Books Received

The Cancer Problem. By William Seaman Bainbridge, A.M., ScD., M.D.; Professor of Surgery, New York Polyclinic Medical School and Hospital; Surgeon, New York Skin and Cancer Hospital, etc., etc. Octavo; 534 pages; illustrated. New York: The Macmillan Co., 1914. Price, $4.00, net.

Abdominal Operations. By Sir Berkeley Moynihan, M.S. (London), F.R.C.S., Leeds, England. *Third Edition.* In two large octavo volumes, illustrated. Philadelphia and London: W. B. Saunders Co., 1914.

A Medical Dictionary for Nurses. Giving the Definition, Pronunciation, and Derivation of Terms used in Medicine, together with Supplementary Tables of Weights, Measures, and Chemical Symbols, etc., Arranged with Special Reference to Use by Nurses. By Amy Elizabeth Pope, Graduate of School of Nursing of the Presbyterian Hospital, New York; Special Diploma, Teachers College, Columbia University; formerly Instructor in the School of Nursing, Presbyterian Hospital; Instructor in the School of Nursing, St. Luke's Hospital, San Francisco, etc. Duodecimo; 288 pages. New York and London: G. P. Putnam's Sons, 1914. Price, $1.00, net.

International Clinic Week at the N. Y. Polyclinic Medical School and Hospital, during the International Surgical Congress, April, 1914. Pamphlet, 103 pages.

A Nursing Manual for Nurses and Nursing Orderlies. By Duncan C. L. Fitzwilliams, M.D., Ch.M., F.R.C.S., Surgeon in Charge of Out-Patients and Lecturer in Clinical Surgery, St. Mary's Hospital, London, etc. Duodecimo; 466 pages; illustrated. London: Oxford University Press, 1914. Price $2.50.

Progress in Surgery

A Résumé of Recent Literature.

Report of a Case of Ununited Fracture of the Tibia Repaired by Bone Grafting. Prescott Le Breton, Buffalo. *Buffalo Medical Journal,* January, 1915.

Le Breton reports an interesting case in which a fracture of the right tibia, a little below the knee joint, was sustained by a child three weeks old, the parts remaining ununited until, at the age of seven years, perfect union was secured by bone grafting. When the child began to walk, the lower leg was bowed, and on weight bearing there was so marked a give "as to remind one of congenital hip dislocation." There was also shortening and atrophy.

An incision was made over the fracture; the ends were cleared of the dense fibrous tissue, and the long end of the upper fragment was cut off and removed. Two canals were chiselled out above and below for a bone transplant. Then, with an electric saw, graft of suitable size was removed from the opposite tibia, fitted into the right tibia, and retained by kangaroo tendon and chromic catgut. A plaster cast with the knee in considerable flexion kept the fragments in line. In eight weeks, union was firm and walking allowed. An osteotomy done to the lower part of the same bone corrected the lower bow leg. The child has now a perfectly straight leg. The sole of the shoe is increased to make up for the shortening.

Prevalent Fallacies Concerning Subacromial Bursitis. Its Pathogenesis and Rational Operative Treatment. Walter M. Brickner, New York, *American Journal of the Medical Sciences,* March, 1915.

Brickner refutes the current misconceptions concerning subacromial bursitis, and sets forth his conclusions, based on the careful study and treatment of a large number of cases, that: there is no diagnostic point of tenderness; usually little or no swelling; the shadow seen radiographically is due, *not* to thickening of the bursal wall, but to a calcareous deposit found in or on the supraspinatus or infraspinatus tendon, and therefore beneath, *never within* the bursa; not only is the removal of the bursa unnecessary, but its complete excision, as some books recommend, is impossible without mutilating dissection; subacromial bursitis is traumatic, resulting from the bruising of the bursa and the underlying tendon, by external violence or, more often, by an unduly vigorous active or passive abduction of the arm; it does not arise from bacterial or toxic irritation.

The calcareous deposit appears early, even in a few days after trauma. Whether seen early or late, within or upon the tendon, it may be semi-fluid or solid, small or large, single or multiple. It does not come from the bone.

He then describes the technic of the operation he employs, which experience has shown him to be the "surest means of early cure." The patient has been placed partly on his side with a cushion under the affected shoulder. From the outer border of the acromion downward over the greater tuberosity, a two and one-half or three-inch vertical incision is made, exposing the deltoid muscle, which, having been split, is retracted. This discloses the roof of the bursa, which is drawn up with forceps away from the floor, and incised, and retracted, exposing the interior of the sac. After all adhesions have been divided, the bursa is explored with the curved scissors and the finger, while the arm is manipulated if necessary. Next the bursal floor is incised in the same line, and dissected up from the supraspinatus tendon. If a deposit is thus found it is removed with a blunt spoon. The tendon then usually reveals a small transverse tear, within which is more of the deposit. Should no extratendinous deposit be found, the supraspinatus tendon is opened axially at the site indicated by the radiograph and the deposit is spooned out. In either case, frayed edges of tendon and adhering granules of lime are removed, and the tendon wound sutured with vertical or transverse chromicized catgut stitches, according as the deposit is extra or intratendinous. If the deposit is not found in the supraspinatus tendon, it is removed from the infraspinatus tendon.

The arm is dressed in abduction of about 120° in light plaster-of-Paris bandage, and remains so until the first dressing—about eight days. The post-operative treatment consists in abducting the arm, especially at night, and exercises, gentle at first, but increasing in vigor about the third week, as necessity dictates. The restoration to full function varies in time, depending on how long the patient has been suffering from the malady, previous to operation.

Fixation of Simple Fractures. John O'Conor, Buenos Ayres. *Annals of Surgery,* January, 1915.

From an experience of thirty years of active surgical practice O'Conor sounds a strong note against early ambulatory treatment, with passive motion and massage instituted soon after bones are fractured. In his opinion at least thirty days of complete immobilization are necessary for an adult's fractured long bone to heal. Early massage, though of value to diminish pain and swelling, brings with it the danger of displacements and a greater number of cases of uninited fractures. Consequently, the author employs massage only after four weeks have passed from the date of injury, *i.e.,* when union is established.

His practice is to wait even where interposing "foreign bodies" prevent union; after four weeks he exposes the site of fracture, removes intervening structures, revivifies the fragments and then plates. Lane plating has proved very gratifying in its results in his hands; he has never observed loosening of the screws or displacement of the plate. The approximation accomplished he always sutures the divided periosteum over the fracture. The wound is

then sutured securely. Extension apparatus is interdicted; instead, the splints are carefully adjusted from time to time; on the forty-second day the splints are removed and massage commenced. At the end of six weeks the plate is removed.

The Treatment of Gun-shot Fractures of the Femur. (*Zur Behandlung der Schussfrakturen des Oberschenkels.*) E. SUCHANEK, Vienna. *Wiener Klinische Wochenschrift*, January 14, 1915.

In von Eiselsberg's clinic, the leg is placed in the so-called Florschütz position, i. e., the leg is suspended from a bar that hangs over the bed, while extension is carried out by means of weights as in the Buck method. When weight extension is of no avail, the author cordially commends the Steinmann method—driving a nail through the condyles and applying extension directly from the nail. He does not approve of the use of plaster of Paris in gunshot fractures, because of the frequency of infection of the wound.

A New Type of Ankle Fracture. F. J. COTTON, Boston. *Journal American Medical Association*, January 23, 1915.

Cotton describes a fracture of the ankle which he thinks is commonly overlooked, though it must have been seen by almost everyone. The characteristic point of the fracture under consideration is backward dislocation with the splitting away of a wedge, large or small, from the back surface of the tibia at the joint—a wedge that is displaced backward with backward dislocation of the foot. This wedge carries the posterior tibio-astragaloid ligaments; foot and tibial fragment move together up and backward. The malleoli are also fractured, usually not unlike that in Pott's fracture, though sometimes the internal malleolus and the posterior tibial edge of the joint are included in one piece that is split away in a spiral line. As a rule, however, that posterior tibial fragment is separate, though association with fracture of both malleoli. It has long been recognized that certain cases of Pott's fracture—so-called—were complicated with backward luxation of the foot, but what has not been recognized is that nearly all these cases are not Pott's fractures at all. In all the cases of ankle fracture that Cotton has had in the past seven years there was only one in which the fracture lesion here described was not present—only one case of real posterior dislocation with Pott's fracture. He is not sure that this type of fracture is not more frequent than the inversion Pott's type, and any attempt to treat it like a Pott's fracture is liable to end in disaster. If the foot and leg rest on the heel the tendency is toward spontaneous reduction, but this occurs only in some of the cases and in many it resists even a considerable force directed toward its reduction. If it is unrelieved such a case must end in a new joint between the tibia and the forward slant or neck of the astragalus, with limited dorsal flexion and without precise support at the sides. A twist is usually given as the cause of the injury. Reduction is simple if the lesion is understood. All that is called for is forward traction with the muscles relaxed in moderate plantar flexion; reduce so and then lock the reduction in maximum dorsal flexion; hold in plaster.

The End-Results of Treatment of One Hundred Cases of Fracture of the Elbow; Immobilization in Hyperflexion Combined with Early Passive Movements and Massage. HAROLD NEUHOF and HEINRICH FRANZ WOLF, New York. *Surgery, Gynecology and Obstetrics*, March, 1915.

In a consideration of one hundred cases of fracture of the elbow referred to the authors in their dispensary classes they found that best results were obtained in those cases that presented themselves for treatment within the shortest period after fracture. They aimed at a standard in end-result defined and upheld by Ashhurst, viz.: "by a 'perfect result' we mean one in which the full and normal range of motion is the sequel of the treatment of a fracture of the elbow. Anything short of this is termed an 'imperfect result.'" With this high standard before them, Neuhof and Wolf discovered that the patients finally discharged with a *perfect* result had appeared for treatment at periods averaging 12.8 days after fracture, while in those patients discharged with an *imperfect* result the average period before treatment was begun had been 32.1 days after fracture.

They used hyperflexion in immobilization, not merely acute flexion, but the most acute flexion in which the elbow could be fixed without obliterating the radial pulse—the angle of flexion produced varied between 20 and 35 degrees. In *recent* fractures this extreme flexion was obtained without difficulty.

As soon as possible after immobilization massage was instituted; the gentlest kind of massage—mere stroking for 10 to 25 minutes at the beginning, gradually making the treatment more vigorous. After each treatment the elbow should always be replaced in hyperflexion. From the very outset active and passive motions should be started in the hand and shoulder.

The Radical Removal of the Verumontanum, with Notes on Pathology. A. G. RYTINA, Baltimore. *Journal American Medical Association*, January 2, 1915.

Rytina describes his technic of the operation for the removal of the verumontanum, which can be performed, he claims, with less risk of subsequent complication than the use of the cautery and the application of strong silver nitrate commonly used. The description of the technic requires the illustrations to make it perfectly clear. The operation is radical, he says, and, in allowing the removal of the almost intact verumontanum, enables us to make accurate pathologic studies, with the result that a more rational interpretation of the symptomatology and therapy may be anticipated. Of course, the operation should only be carried out in specially selected cases. He describes the anatomy and histology of the parts and of the sinus pocularis, which his studies show is a long canal lined by a many layered, squamous epithelium ending in the substance of the verumontanum by a complicated system of invaginated processes. The structure is clearly favorable for retention products and suggests difficulty in eradicating infection, which is the sole cause, as far as seen by him, of pathologic conditions of the verumontanum. His conclusions are as follows: "1. Colliculectomy is a simple operation for removal of the verumontanum It is less liable to untoward complications and sequelae than strong applications of silver nitrate or the thermocautery. 2. The study of the pathology of the verumontanum is made easy, in consequence of which a therapy will be devised that will be based on science, rather than on empiricism. 3. Surface applications of mild antiseptic solutions seem to be rational. Strong penetrative cauterant substances may have great therapeutic value in curing infections, but may do more harm than good, on account of the production of untoward complications or sequelae. 4. A straight-beaked colliculectome lends itself to removal of vegetation and polypi from any part of the anterior urethra."

Studies in Obscure Forms of Prostatic Obstruction and Vesical Atony. BRANSFORD LEWIS, St. Louis, Mo. *Annals of Surgery*, March, 1915.

Upon a correct understanding of the exact causation of urinary obstruction and its cogener, vesical atony, depend the treatment and prognosis of the case. Lewis holds there is no such thing as "unaccountable atony" or urinary retention, nor such a thing as "incurable atony" except when caused by some nerve-degenerative process as tabes; these terms are unjustifiable since they represent an incomplete diagnosis.

Before adopting a plan of treatment the exact cause of the malady should be sought; this will always fall within one of two groups of causes, viz.: (1) physical obstructions, or (2) disturbances of nervous mechanism controlling urination. For cases in the second group much can be done locally and internally to facilitate urination; for cases in the first group the physical obstruction must be removed before the expulsive forces become restored. Not infrequently syphilis is the underlying cause of the urinary

retention, and here Wassermann blood and spinal fluid tests are imperative. A contracture of the vesical neck (at times demonstrable only through the opened bladder or urethra) may also act as an underlying, unrecognized cause of bladder atony with urine retention. Furthermore, these conditions often go undiagnosed in early age, from infancy up, and early and correct recognition of such cases offers the best likelihood for proper treatment before they grow hopeless.

Urinary Catalase in Health and Disease. By MAX KAHN and CHARLES J. BRIM, New York. *American Journal of Obstetrics,* January, 1915.

The authors find from a number of examinations that catalase is found in traces in normal urine that has been freshly voided. In urines which contain blood, bile and acetone, the catalase content is usually high. Cases of lymphosarcoma and Hodgkin's disease show a high catalase content and patients suffering from diabetes with acidosis eliminate largely increased amounts of catalase; diabetes without acetonuria, however, have normal amounts.

Observation of Torsion of Ovarian Cysts with Report of Cases. By K. I. SANES, Pittsburgh. *American Journal of Obstetrics,* January, 1915.

In reporting nine cases of this disorder, Sanes says the differential diagnosis lies between pelvic inflammation, inflammation of the cyst, gall-bladder or kidney colic, ruptured ectopic gestation, appendicitis with or without pregnancy and perforation of a hollow viscus. The diagnosis is simple if the pain and tenderness are localized over the tumor, the presence of which was known to the patient. In a stout patient with rigid abdomen, anesthesia may be necessary before a diagnosis can be made. After the acute stage is passed, the diagnosis will be easier, as the mass can be more definitely outlined. A history of frequent attacks of pain out of proportion to the low pulse and temperature is a valuable diagnostic aid.

The Roentgen Diagnosis of Gall Stones by Improved Methods. LEWIS GREGORY COLE, New York, and ARIAL W. GEORGE, Boston. *Boston Medical and Surgical Journal,* March 4, 1915.

These authors maintain that they have detected gall-stones roentgenologically in about fifty per cent. of cases they have examined. This improvement they attribute to (a) a special technic for making the roentgen plates, using the Coolidge tube; (b) a careful study of these plates particularly superimposing one plate over another so as to match together the several shadows of the gall-bladder region; (c) skilful interpretation, which comes from a thorough intimacy with the *x*-ray appearance of gall-stones. Where there is no direct *x*-ray evidence of gall-stones they advise examination of stomach, cap, duodenum, and colon for adhesions, accompanying a cholecystitis. Where no roentgen-ray evidence of cholelithiasis is present, the authors suggest that operative procedure is warranted only when the clinical history is characteristic and not merely suspicious, as is so frequently the case.

Pylorectomy and Partial Gastrectomy or Excision of the Ulcer-Bearing Area in the Treatment of Gastric Ulcer. WILLIAM L. RODMAN, Philadelphia. *Surgery, Gynecology and Obstetrics,* January, 1915.

Pylorectomy is the operation of choice if the ulcer is situated at or near the pylorus, twice the majority of ulcers are thus situated. Hemorrhage, perforation and cancer are thus frequent results of gastro-enterostomy, that gastro-enterostomy is an inadeqate operation. Though more radical and slightly more dangerous, excision and pylorectomy are more beneficent. If the pylorus and the proximal portion of the duodenum are not easily mobilizable, however, a simple gastro-enterostomy should be done. The pylorectomy may be performed in two stages if it should seem desirable for the patient's safety. Because ulcers are so frequently multiple, the more radical measure should be preferred. Ulcers away fom the pyloric end should preferably be treated by gastrectomy or removal of the ulcerated area. Simple excision should be the operation of choice, and this may be supplemented by a gastrojejunostomy.

Experiments in the Transplantation of Gastric Mucous Membrane. WILL DOOLIN, Dublin. *Surgery, Gynecology and Obstetrics,* January, 1915.

Doolin's experiments show that the autoplastic transplantation of gastric mucous membrane in dogs is feasible and leads to definite cyst formation. The cysts arise from epithelial islets which survive the general necrosis of the graft which depends for its blood-supply upon adhering omentum. Tubular grafts of hollow abdominal mucosal tissue depend for their success upon their muscularis, the canal being later lined with epithelium growing in from the surroundings.

Boiling Water Injections Into the Thyroid Gland for Hyperthyroidism. MILES F. PORTER, Fort Wayne. *Surgery, Gynecology and Obstetrics,* January, 1915.

Porter believes that the injection of boiling water into the enlarged gland should take the place of medical treatment in patients with small thyroids and moderate symptoms of hyperthyroidism. The method is peculiarly valuable in those patients in whom a lobectomy has been done and who are still suffering from symptoms of hyperthyroidism with hypertrophy of the remaining lobe. Patients with large goiters and with pronounced symptoms should be so treated until they can be safely operated upon. The injections are not recommended in non-toxic cases as thyroidectomy is then the procedure of choice. The examination of specimens treated by injections of boiling water and subsequently removed shows connective tissue proliferation in the gland.

Goiter in Children. COLEMAN G. BUFORD, Chicago. *Surgery, Gynecology and Obstetrics,* January, 1915.

Buford says that goiter in children is common in Chicago, occurring in certain districts and appearing most often when certain sewage-impregnated waters are used for drinking purposes, which he believes is the cause of the disorder. He also thinks it likely that foeal infections from the tonsils, adenoids or teeth may supply the excess of bacteria ingested and produce goiter singly or in conjunction with the water supply. Theoretically, the thyroid gland is an agent for the destruction of bacteria and it enlarges under these conditions or it elaborates a product to destroy the bacteria or their toxins. When the work of the gland is excessive, it enlarges through hypertrophy; when compensation is incomplete or the dose is continuously large or toxic, constitutional damage results. In the cases of children, spontaneous cure is often seen. The recognition of goiter in children is very important for with diligent supervision and treatment future deformities and ill-health may be avoided.

A Consideration of the Various Methods of Blood Transfusion and its Value. JOHN A. HARTWELL, New York City. *New York State Journal of Medicine,* November, 1914.

The transfusion of blood is a homologous transplantation of tissue. It represents neither a physical nor a chemical mixture. It is indicated best of all in real bleeding, *i.e.*, ectopic, ruptured ulcer, injury, etc., next in anemias, whether primary or secondary, lastly in toxic conditions, metabolic or bacterial. Transfusion shows its greatest usefulness in repleting loss of blood in conditions where the underlying cause of hemorrhage can be remedied; in the other instances transfusion has but a passing value.

The method that followed Carrel, artery to vein and more recently vein to vein, is still in vogue. Here there is always present the danger of clotting, nor can the exact amount of transferred blood be figured; besides, the method is limited to those of specified skill, and is accompanied by discomfort for the patient, the donor, and the surgeon often.

Lindemann's method is an improvement. He uses many (about twenty-five) 20 c.c. Record syringes kept constantly

washed and immersed in saline by an assistant. A special nest of three canulæ is employed, the outer one being rounded on the end to avoid injury to the intima in transferring the syringes, one after the other, from donor's to recipient's canula; 800 to 1,000 c.c. of blood can thus be transferred in ten to twelve minutes. This method is excellent in many hands.

Best of all is a method devised by Satterlee and Hooker. It is based on the old principle of intermediary tubes which were paraffined formerly and often not free from errors in technique. Satterlee and Hooker, however, introduce an outside canula into the donor's vein exposed by a small incision—a smaller canula, paraffine coated, is passed for a farther distance into the vein away from the site of injury, thereby avoiding disintegration of the thromboplastic substances in the formed blood elements. The blood now passes into a receptacle where coagulation is prevented by the presence of 2 c.c. of a 1 to 500 saline solution of hirudin representing 0.004 gms., an amount sufficient to keep the blood in the 220 c.c. receptacle fluid for 20 minutes. This blood is then injected into the recipient. Hartwell claims that this last procedure is in all respects an ideal one.

Observations on the Treatment of Tetanus with Subcutaneous Injections of Magnesium. (*Einige Beobachtungen bei Behandlung von Tetanus-Verwundeten mit Subkutanen Magnesiuminjektionen.*) A. FALK, Berlin, *Deutsche Medizinische Wochenschrift*, October 29, 1914.

Falk employed 2 to 3 c.c.m. of novocaine (1%) at the site of injection before introducing the magnesium sulphate solution, and so produced no pain. He used a 30% solution, giving 5 to 12 gms. as one dose, repeating this about three times within twenty-four hours; where necessary, *i.e.*, in very severe cases, large doses were imperative. In no instance were any ill-effects observed. In fact, small doses caused irritative phenomena with spasms that were exaggerated and increased in frequency.

Choral and morphin were of essential help—the author states these drugs did not slow or labor respirations while the magnesium injections were used. They did allay tetanic attacks. Folk reports good results for this treatment as employed by himself and many colleagues.

The Treatment of Chronic Leg Ulcers. H. D. SONNENSCHEIN, *New York Medical Journal*, December 19, 1914.

The author reports excellent results by baking the leg in an electric dry air oven at a temperature of 250° to 300° for a period of twenty minutes to one-half an hour, depending upon the case and the patient. The number of treatments averages three a week.

Sulphurous Acid in the Treatment of Furuncles. P. G. SKILLERN, Philadelphia. *New York Medical Journal*, December 19, 1914.

Skillern recommends the internal administration of sulphurous acid in doses of a teaspoonful, well diluted, thrice daily. The duration of the boil is shortened, and in a series of thirty to fifty cases the author has never seen a recurrence.

The Fulguration Treatment of Certain New Growths. A. F. TYLER, Omaha. *The Urologic and Cutaneous Review*, December, 1914.

Fulguration implies the use of a high voltage, high frequency electric current so produced as to yield a high amperage. Such a current can cause cauterization and has advantages over ordinary surgical treatment in that there is no scar formation in the tissues treated, there is no danger of opening adjoining blood and lymph vessels, there is possible exact regulation of the dosage of the effect required. The method of treatment has particular value in dealing with growths of the face. Tyler obtained excellent results with fulguration, treating keratosis and epithelionia of the lip, also fibroid and sarcoma conditions.

The apparatus is not formidable, is simple to operate, and is not very expensive.

Cancer of the Breast. W. SAMPSON HANDLEY, London. *Surgery, Gynecology and Obstetrics*, January, 1915.

Discussing the theory of the permeation of cancer from the operative standpoint, the author says that the area which demands widest removal is that in which the growing edge is situated, that is, the deep fascia in which is found the lymphatic plexus which forms the highway for the spread of the disease. The area of deep fascia removed must be roughly circular in outline, since permeation spreads with approximate equality in all directions from the primary growth, which must be the center of the area of fascia removed. The skin and muscles are not involved to the same extent as the fascia, but the invaded regional lymphatic glands must be removed.

Some Observations Upon Primary New Growths of the Mediastinum, From a Study of Sixty Cases. J. N. MACBEAN ROSS, London; *Edinburgh Medical Journal*, December, 1914.

From an analysis of sixty cases the author draws the following conclusions:

Malignant disease of the mediastinum is not so rare as is generally believed, whereas innocent tumors of the mediastinum are exceedingly infrequent. It is essentially a disease of early middle life, but may occur at any age. It seems to be increasing in frequency. It is twice as common in males as in females. A definite tuberculous history is often found. Though tubercle bacilli are rarely present in the sputum, there is possibly some relationship between tuberculous and malignant disease. The anterior mediastinum is the usual seat of illness. Sarcoma, usually lympho-sarcoma, is the commonest form of tumor. Carcinoma is relatively more common in females. The lungs are practically always affected, sooner or later, and pulmonary symptoms are usually present. The right lung is more often affected than the left. Extra thoracic metastases are common. The persistent absence of tubercle bacilli from the sputum, in a case suggesting pulmonary tuberculosis is suggestive. Hemoptysis, though moderately common, is rarely severe. A pleural effusion is often present, and often hemorrhagic. Microscopic examination of the fluid is rarely of diagnostic significance.

Banti's Disease; Report on Operative Cases. JOSEPH SAILER, Philadelphia, *The Pennsylvania Medical Journal*, November, 1914.

Sailer describes in detail three cases of Banti's disease which had been treated by splenectomy. Two of the three recovered, but the third succumbed three days after operation, which was performed when the patient was in an extremely anemic condition, owing to recent hemorrhages. The author believes that splenectomy is the treatment of choice, but that as the operation is one of great severity, it should not be performed unless the patient has been put into good condition by medical treatment. One of the three reported cases is of interest in that it ran a very short course—two and a half years, and that the patient suffered attacks of great pain due to hemorrhages in the gastro-intestinal tract and in the kidney. The author believes that in his cases syphilis could be absolutely excluded.

Extirpation of the Spleen for Pernicious Anemia. (*Milz Extirpation bei perniziöser Anämie.*) N. v. JAGIC, Vienna. *Wiener Klinische Wochenschrift*, November 26, 1914.

Jagic reports three cases. In all there was considerable symptomatic improvement, although the blood picture had not altered. The author believes that removal of the spleen eliminates only one of the causes of pernicious anemia. He believes that the constantly present atrophy of the gastric mucosa is one of the important primary foci of the disease, and that therefore removal of the spleen alone cannot effect a cure. He does not deny the possibility that part of the improvement noted in his cases was due to a remission, an incident notorious in this malady.

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OIL-ETHER COLONIC ANESTHESIA.

JAMES TAYLOE GWATHMEY, M.D.,
NEW YORK.

Rectal anesthesia was of little practical value until Cunningham of Boston used air as a vehicle for the introduction of the ether vapor, and it is almost unnecessary to state that the original work of Cunningham and Sutton's improved technic and careful record of cases were most important factors in the development of oil-ether colonic anesthesia.

PHYSIOLOGICAL EFFECTS OF OIL-ETHER COLONIC ANESTHESIA ON THE ORGANISM.

In a very short time after entering the rectum the oil-ether mixture becomes heated to body temperature. As this occurs some of the ether leaves the oil in the form of gas and is absorbed by the blood circulating in the small capillaries surrounding the colon, and thence into the greater circulation. It then passes through the lungs, where part of it is excreted and lost, the remainder is immediately reabsorbed and thus reaches the brain. Blood pressure remains constant.

As a large quantity of the vapor is lost by exhalation the *brain* is never as deeply narcotized as when routine inhalation methods of anesthesia are used. Sensory paralysis of the extremities is first produced with this method and the higher centers of the brain are the least affected. In recovery from anesthesia consciousness is regained long before sensations of pain are manifested.

Although the reflexes are active there is a great degree of relaxation throughout the *muscular system.*

Four factors acting in harmony tend to automatically maintain an even plane of anesthesia: (1) the *constant rate of evaporation* of the ether from the oil; (2) the *distension of the colon,* for when the colon is distended less ether is absorbed than when it is only partially distended; (3) as the ether leaves the oil both the *mixture* and the *gut* are *cooled,* which retards elimination and absorption; and (4) the difference between the *absorptive power* of the *colon* and the *eliminative capacity* of the *lungs.*

INDICATIONS AND CONTRAINDICATIONS.

Oil-ether colonic anesthesia is indicated in (1) neurotics and cases in which fear is pronounced, as in goiter; (2) obese individuals with narrowed air passages; (3) for *bronchoscopy, gastroscopy,* and all operations upon the *respiratory tract, head, neck and chest.*

The technic is contraindicated in cases (1) in which ether is contraindicated, except when the patient has been ill from a previous etherization; (2) *colitis, hemorrhoids, fistulae* and other pathological conditions of the lower bowel; (3) when considerable rectal pain is caused by the introduction of the solution.

AFTER-EFFECTS.

The after-effects are reduced to a minimum and compare most favorably with the post-anesthetic sequelae following routine methods of administering ether or chloroform. The method has been used to anesthetize consumptives, asthmatics and patients afflicted with bronchitis, and in no instance has the previous condition of the patients been made worse.

THE TECHNIC OF ADMINISTRATION.

The patient. The administration of oil-ether colonic anesthesia is best accomplished with the patient in the *Sims position in his own bed.* If the patient is in a ward, the *bed should be screened.* Exposure of the patient may be avoided by introducing the rectal tube between two suitably adjusted sheets. The patient should be kept very quiet and should never be left alone at any time after having received the injection.

Apparatus. The only apparatus required consists of a special rectal tube ¼ inch in diameter and about 28 inches long; a clamp for this tube; a 3-inch funnel into which to pour the mixture and a Gwathmey tube about 30 inches long and ⅜ inch in diameter. These should be sterilized before use.

Preliminary treatment. Give a cathartic of castor oil the night preceding the operation. Avoid purging. Follow this in the morning by warm water enemas, one hour apart, until the return is clear. Then allow the patient to rest for 2 or 3 hours.

(1) *One hour* before operation give slowly per rectum, with the patient in the Sims position,

Chloretone	5 to 20 gr.
Oil-Ether Mixture, aa	2 to 4 dr.

The chlorotone may be given separately in a suppository, or some other hypnotic of equal value may be used.

(2) *Half an hour* before operation give by hypodermic injection,

Morphin	1/8 to 1/4 gr.
Atropin	1/150 to 1/100 gr.

Instead of the above, in alcoholics or athletes, *two hours before operation* give 1/100 gr. of hyoscin hydrobromid hypodermatically and *one hour* before the operation repeat the hoyscin with ¼ gr. morphin, omitting the rectal preliminary.

No preliminary medication is needed for children under 9 years of age.

Induction. Twenty minutes before the operation administer the oil-ether mixture very gradually, one ounce per minute, through the funnel attached to the cathether, which has been well lubricated and inserted 4 inches within the rectum.

(1) Mixture for adults:
Olive Oil .....2 oz.
Ether .....6 oz.

(2) Mixture for weak, anemic patients:
Olive Oil .....45 to 25 per cent.
Ether .....55 to 65 per cent.

(3) Mixture for children:
Ether-Oil, aa. .....50 per cent.

proaches the danger zone, as indicated by the *loss of the lid reflex, slight cyanosis or stertor,* withdraw 2 or 3 ounces of the mixture remaining in the colon. If this is insufficient, introduce a Connell breathing tube to lighten the anesthesia, or transfuse 1,000 to 2,000 c.c. of normal saline solution intravenously. If *respiratory arrest* occurs, place a bag filled one-third full of carbon dioxid over the face and use artificial respiration. If narcosis is too light, a towel placed over the face and slightly puckered just above the nose and mouth, but held securely to the face around the edges, will deepen it.

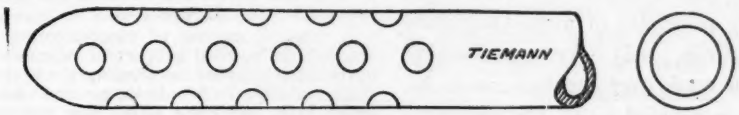

FIG. 180.—GWATHMEY RECTAL IRRIGATION TUBE.

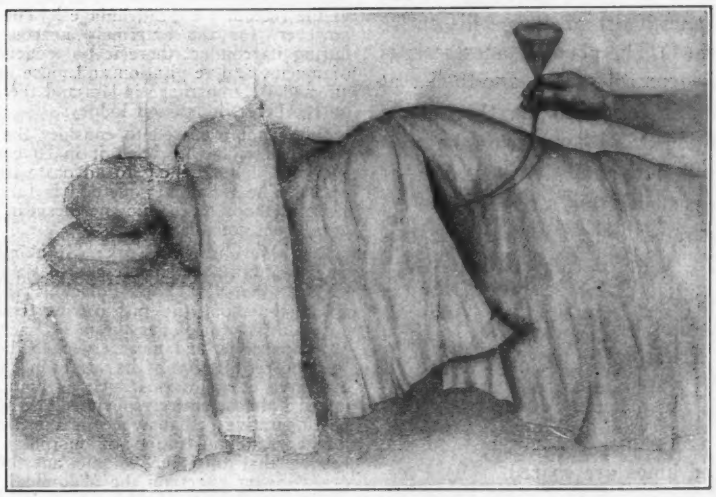

FIG. 181A.—SHOWING PATIENT IN POSITION FOR OIL-ETHER ADMINISTRATION.

Introduce one ounce of the oil-ether mixture for every 20 pounds of body weight, except for obese persons. Eight ounces of a 75 per cent. mixture will maintain anesthesia from 2½ to 3 hours. *No more than 8 ounces should ever be given.* If the patient goes to sleep before the required amount has been given, STOP! If narcosis is much delayed, a few whiffs of chloroform may be used.

Keep an unobstructed airway at all times by manipulating the jaw as in inhalation anesthesia, and by preventing the head falling forward or sideways, or the tongue dropping back, thereby cutting off the air supply.

Maintaining surgical anesthesia. In surgical narcosis *breathing is quiet and regular;* the reflexes are active and the pulse normal. If the patient ap-

AFTER-TREATMENT.

At the conclusion of the operation irrigate the rectum immediately with cold soap-suds and at the same time massage the colon gently from right to left in order to expel any liquid that may remain. Withdraw one tube. Introduce 2 to 4 ounces of olive oil and 1 pint to 1 quart of water and withdraw the remaining tube from the rectum.

THE LATEST TECHNIC.

Recently by using paraldehyde as the preliminary, the necessary amount of oil-ether mixture has been reduced one-third to one-half.

Preliminary medication. Administer per rectum, one hour before operation,

Morphin. Alk. ..... ⅛ gr.
Paraldehyde .....1 dr.
Oil-Ether, aa. .....3½ dr.